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THE CLINICAL FEATURES OF SPORADIC TRICHINOSIS.

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Occurring in the form of an extensive outbreak following a *fest*, no disease is more readily recognized than trichinosis, as in the epidemics at Hadersleben and Emmersleben, in which several hundred persons were attacked. In the smaller, more common family outbreaks, as they may be termed, the diagnosis is rarely in doubt. The difficulty really arises in the sporadic cases, a very large proportion of which are overlooked. Clinically, in hospitals and in private practice, trichinosis is an exceedingly rare disease, and yet in post-mortem and anatomical work the number of subjects in which calcified trichinæ are found is by no means inconsiderable. My own experience in this matter illustrates this. When a student at the Toronto School of Medicine, in 1868, I found two subjects with calcified trichina cysts, from one of which I reared in rabbits the adult worms. I found them in six subjects in the post-mortem-room of the Montreal General Hospital. I saw them in two at the post-mortem room of the Philadelphia Hospital, and the other day Dr. F. A. Packard reminded me of a case in which we had found them in the dead-house at the hospital of the University of Pennsylvania. In all of these eleven cases the trichinæ were widely spread throughout the muscles, and during the invasion the subjects must have had a very serious illness. Dr. Flexner tells me that among the first 1000 autopsies in my colleague Welch's department of the Johns Hopkins Hospital there were three cases.

Until quite recently I have had no clinical experience with the dis-

case, having seen (to recognize) but one case in Traube's clinic in Berlin, in 1873. The probability is, of course, that in a hospital service of more than twenty years I have frequently overlooked cases, just as might have been done in three or four of the cases here reported. Within the past two years and a half five cases have been in my wards —one in March, 1896; two admitted during 1897, and two during the present year, 1898. I propose to take up the clinical features presented by them, and to gather, if possible, some facts which may perhaps enable us in the future to recognize this disease more readily. As a preliminary I would like to give an abstract of the history of the first case in which it was recognized that in man the trichinæ produced a severe and fatal disease. Before 1860 the presence of the parasites in the muscles was regarded as an anatomical curiosity. The report is by Professor Zenker (*Virchow's Archiv*, Bd. xviii.), the well-known pathologist, at present in Erlangen, at that time in Dresden. A girl, aged twenty years, was admitted to the City Hospital, Dresden, on January 12, 1860. She had been ailing from about Christmas time, and about the New Year had to go to bed. She complained of debility, sleeplessness, loss of appetite, constipation, fever, and thirst. At first the fever was very intense, and the abdomen was distended and painful. Although there was no enlargement of the spleen, and rose spots were not present, the diagnosis of typhoid fever was made. Very soon there developed throughout the entire muscular system extreme pain, particularly in the extremities, so that the patient complained day and night. The arms and legs were held bent at the elbow and knee-joints, and could not be extended without the greatest pain. An œdematous swelling of the legs was present. Later a low typhoid pneumonia appeared; the patient became profoundly apathetic, and died on January 27th. The autopsy was performed the next day, and Professor Zenker says: "One can judge of my astonishment when I, in the first microscopical preparation made, saw at a glance dozens of non-encapsulated, free trichinæ in the parenchyma of the muscles." Further investigation showed the muscles to be swarming with the worms. There was no involvement of the Peyer's glands. In this case Zenker determined two other very interesting points, namely, the presence of the living adult trichinæ in the intestines, and he also found muscle-trichinæ in the flesh of the animal a portion of which the girl had eaten on December 21st. The publication of this classical case, in March, 1860, aroused the greatest interest; and clinically the discovery may be said to be the most important helminthological contribution of the century.

It was very soon determined that the disease was a very serious one, particularly in countries such as North Germany, in which the habit prevailed of eating swine flesh in a raw or only partially cooked state. The dread lest the disease should be carried by American pork has been

the cause of no little friction between this country and Germany, though a few years ago Carl Fraenkel stated that it was very doubtful if any case of trichinosis had been caused in Germany by American pork. There is very little question, however, that in this country the hog is more frequently infected with trichinæ than in Germany. That the disease is much less common is owing altogether to the habits of the people, only a small number of whom eat pork in a raw or partially cooked state. In the hospital wards I fear we see cases without recognizing their nature.

The following is the abstract of the histories of the cases:

Case I.—Robert T., an Englishman, aged twenty-eight years, admitted March 3, 1896, complaining of pains in the body and fever. There was nothing special in his family or personal history.

The patient had been out of work for three months, during which time he had been in Waterbury, Conn., New York, and Philadelphia. He had been in Baltimore for two weeks, had been a good deal exposed, and had had insufficient food.

Present Illness. For six or seven weeks he has had vague pains in the muscles of the legs, which felt tired and as though they had a ton weight, as he expressed it, attached to them. He had no diarrhœa or vomiting, except on one occasion, when he vomited after he had eaten something that had disagreed with him. For two weeks he had been much worse, had a very full feeling in his head; he had no chill, no cough. He had walked about each day, but had felt that he was getting weaker, and this morning on coming to the hospital had to be assisted.

On admission the temperature was 102°, pulse 104, respirations 24. He was a well-nourished, medium-sized man; lips and mucous membrane pale, tongue heavily coated. There were tenderness and hyperæsthesia everywhere, and the patient groaned when any motion was made. The heart's action was rather forcible, and he had an apex systolic murmur. The spleen was not palpable. The abdomen was tender; there was gurgling in the right iliac fossa. On the following day the diazo reaction was found to be present in the urine. The temperature rose in the night to 104.5°, and we regarded the case as one of typhoid fever. For the next four days his temperature ranged from 102° to 104°; the tongue was very heavily furred. The spleen could not be felt, and there were no rose spots. He complained only of muscular pains.

A very careful examination of the blood was made on March 5th. The leucocytes were 17,000. A differential count by T. R. Brown, the clinical clerk, gave a percentage of polynuclears, 55; transitional, 1; mononuclears, 4; lymphocytes, 3; and eosinophiles, 37.

On March 7th Dr. Thayer noted that the patient complained of general soreness and tenderness, also soreness in the gluteal region on pressure. The spleen was not palpable; there were no rose spots. The diazo reaction persisted. On March 9th the patient looked very dull and heavy, and the tongue was dry and coated. The pulse was 96, tension rather low. The patient still complained very much of pains in his muscles and in various parts, particularly in the right arm on

pressing the biceps. He also flinched on pressing the muscles of the legs and thighs. Up to this time we had regarded the case as probably one of typhoid fever. There was no œdema of the eyelids.

On the 10th and 11th the temperature was lower, and reached normal. The soreness, however, persisted, and on the 12th at noon Dr. Parsons excised a piece of the biceps muscle of the left arm, in the most tender region. Numbers of trichinæ were found in the examination of the fresh teased muscle.

From this date on the patient did remarkably well, and the fever subsided, though until the 23d there were still slight daily elevations. He presented at no time any œdema of the face or eyelids, but after he got up, at the beginning of April, he had swelling of the ankles for several days. He remained in the hospital through April and until the 13th of May. He improved progressively, but walking about a great deal tired him. The study of his blood by T. R. Brown to the date of his discharge is given fully in his paper.[1] The eosinophilia persisted, and on the day of his discharge the percentage was 16.8.

CASE II.—Emile B., aged twenty-nine years, a sailor, of German nationality, admitted April 15, 1897, complaining of chills and fever, muscular pains, and weakness. The patient had been on a steamer sailing between Baltimore and Cuba.

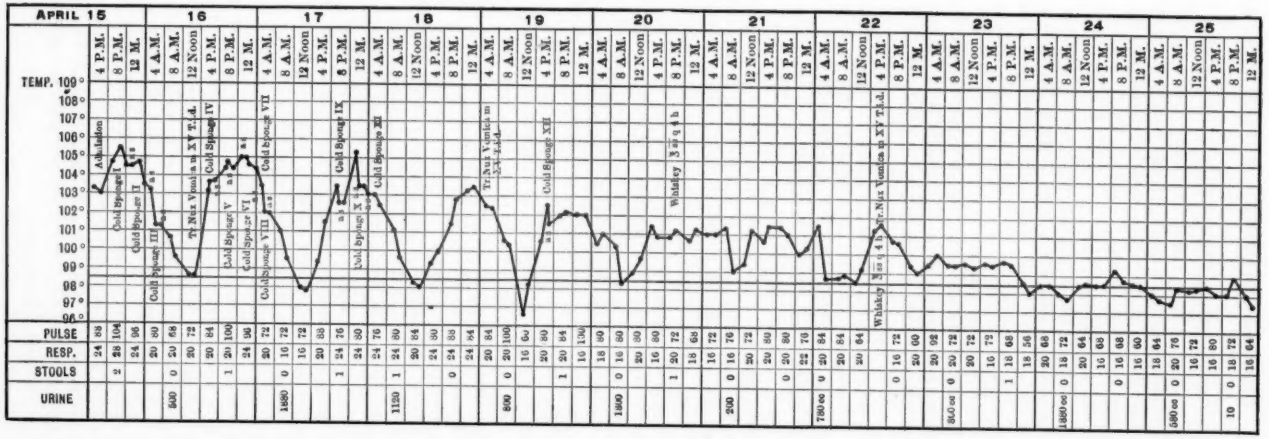
Present Illness. He dated his illness from the first week in April. It set in gradually with loss of appetite, muscular weakness, and uneasy, painful sensations in the abdomen. He had headache for the first time on April 9th, which continued until admission. The bowels were regular until the day of admission, when he had two liquid stools. On the 10th he noticed a rather sudden œdema of the eyelids and face, which caused him some discomfort and some pain on opening and closing the eyelids. Since the 11th there had been pain in the muscles of the back, in the calves of the legs, and, while eating, in the muscles of the jaws. He thinks he had fever, and he had shaking chills at intervals. On shipboard the patient ate mostly salted meats, but had frequently eaten raw sausages, but never raw ham. His temperature on admission was 103°, and rose by 8 P.M. to 105.5°. The pulse was 120, slightly dicrotic.

The patient was a very well-developed man, with good color. The upper eyelids looked a trifle redder than the face and were a little swollen; no œdema elsewhere. On opening and closing the mouth he had slight pain and stiffness at the angles of the jaws; no pain on pressure in the muscles of the calves or in the arms. He drew a deep breath without pain. The spleen was palpable. There were two slightly suggestive rose spots seen. There was no glandular enlargement. On the morning following admission his temperature dropped to normal, and, as he had just come from Cuba, malaria was naturally suspected, and the blood was examined with great care, but was negative. On the day of his admission the blood showed 13,000 leucocytes per c.mm.; red blood-corpuscles 5,000,000 per c.mm. A differential count of the leucocytes by Dr. Futcher showed 44 per cent. of eosinophiles.

On the 16th, 17th, and 18th the temperature was typically intermittent, rising each day to about 105° and sinking to normal, or, as on the 19th, to subnormal. We were still very suspicious of malaria, but

[1] Journal of Experimental Medicine, 1898, vol. iii.

CHART I. CASE II.



repeated examinations of the blood by Dr. Thayer showed it to be without parasites or pigment. The differential count of the leucocytes by Dr. Futcher showed 42 per cent. of esoinophiles. On the 18th the spleen puncture was made with negative results so far as parasites were concerned. There was no Widal reaction.

After the 20th the temperature did not rise above 102°, and on the 24th fell to normal. He had very little pain in the muscles after the first few days in the hospital, and we were in considerable doubt as to the nature of the case. The persistent increase in the esoinophiles suggested trichinosis, and the stools were examined with great care, but no parasites were found.

On the 21st Dr. Young excised a portion of the muscle, in which the trichinæ were found by Dr. T. R. Brown, who in his paper on the condition of the blood in trichinosis deals very fully with the blood condition in this patient also.

After the 24th there was no further fever, and he made a very satisfactory convalescence. He left the hospital on May 18th.

One interesting point which may be mentioned in his case was the low morning temperature which he had for weeks. For several hours each morning it was between 96° and 97°.

Case III.—John H. Y., aged forty-seven years, a German, admitted December 31, 1897, complaining of headache, pain in the left side, chilly sensations, and swelling of the feet. He had been in the hospital in July of 1897 with typhoid fever—a moderately severe attack. The blood on his second admission gave the Widal reaction.

The patient lived with his German employer, and frequently had eaten sausages and other forms of pork insufficiently cooked.

Present Illness. Five weeks ago he began to have frontal headache and cough. It followed exposure and a thorough drenching. He does not think that he had fever. His work required him to be up at 3 A.M., and for the past five weeks he has had a coughing spell each day just after rising. He also vomited, which gave him some relief. He had not had any bleeding from the nose, nor chills. Five days before admission he had diarrhœa, four or five stools daily, associated with griping pains in the abdomen. For two or three days after this he noticed pain and numbness in the legs, feet, and arms, and the skin on these parts felt tight and cold. About the same time he noticed stiffness of the knees and elbows and other joints, and he thought that his legs and feet and arms were a little swollen. His employer called attention to the fact that his eyelids were swollen. He evidently could not have been very ill, for he kept at work until the day before admission. He had, however, to be helped to the hospital.

On admission the patient looked well nourished; the eyes were suffused, reddened, and the eyelids puffy. The temperature was 102.5°, the pulse 112, respirations 32. The abdomen was a little swollen, but not tender. There were no rose spots. The spleen could not be felt.

On the 22d the temperature ranged between 100° and 103°. He complained of pains in the arms and legs, which were particularly severe at night. There was slight tension of the skin, as if the muscles were swollen.

Shortly after admission the blood, examined by Dr. Gwyn, was negative for malarial parasites, but there was a great increase in leucocytes, 34,000; eosinophiles, 45 per cent.

I saw this patient at the ward class, and there were two or three points about the case which impressed me very much: in the first place, the puffiness of the eyelids and the suffused, puffy condition of his face. The hands were quite cyanotic and looked a little swollen. He made a fist with difficulty. The muscles of the forearm were quite tender and looked a little swollen, and in places there was a slight erythema of the skin. This was especially the case in the bicipites, which were very sore. The feet were livid; the legs were very stiff on attempting movement. The muscles of the calves were not specially tender. The stools were examined with care, but were negative. The following day the muscular sensitiveness had diminished considerably. I made a careful examination of the individual muscle-groups without finding any extreme sensitiveness. The stools were examined, and the eggs of the common ascaris were present in considerable numbers, but no trichinæ. He had a purge the evening before. On the 23d a small piece of muscle was removed. The urine contained neither albumin nor sugar; there was no diazo reaction.

The temperature fell to normal on the 24th, and for the next week there was an occasional rise to 100°. After January 2d the temperature remained low. For days it did not reach 98°, and the morning record was sometimes 96°. By the 24th the blueness of the hands and feet had disappeared; there was still a little puffiness of the forearms. Following the purge he had some diarrhœa, which, however, was checked by the 25th.

In the hardened specimen of the muscle the parasites were found in the early stage of development. The differential count of the leucocytes by Dr. Gwyn showed a maximum of eosinophiles on January 10th of 50 per cent. The range was constantly above 40 per cent.: and on his discharge, January 16th, quite well, the leucocytes were 8000 and the eosinophiles 48.3 per cent.

Case IV.—John L., an American, aged thirteen years, admitted August 4, 1898, complaining of headache. There was nothing special in his family or personal history.

He had always been a very healthy boy; is a huckster by occupation.

Present Illness. He began to feel badly on Saturday, July 30th. On the following day he had bleeding at the nose. The headache continued through Monday and Tuesday. On Saturday he also had pains in his legs. His bowels had moved regularly; he had had no chills and no vomiting or nausea. He complained of nothing but the headache and the pains in his legs.

On admission he was a healthy looking boy, with good color. He had a rather dull facial expression. The tongue was coated. The eyelids were somewhat swollen. The temperature was 100°, pulse 108, respirations 28. There was no swelling or tenderness of the abdomen, no rose spots; the spleen was not palpable. On the following day he seemed much better; the temperature was only 100°; he had a very dull, heavy expression, suggestive of typhoid fever. The tongue was thickly coated. The edge of the spleen was readily to be felt below the left costal margin. There were no rose spots. There was a good deal of gurgling in the right iliac fossa. The Widal reaction was not present. There was no diazo-reaction in the urine. He had no diarrhœa.

For the first week in hospital there was really nothing to attract attention about this case. It looked like a mild case of typhoid.

On August 8th, however, it was determined that he had a marked leucocytosis, above 18,000, and this rather excited the attention of Dr. Thayer, as it is so rarely met with in this disease. A differential count showed that 48 per cent. of the leucocytes were eosinophiles. A more careful examination was then made of the muscular system of the boy, but nothing further was elicited; there was no tenderness, no swelling.

On August 11th a piece was excised from the muscles of the right calf. Dr. Brown had found from previous experience that if only a small piece of the muscle was taken it was safer to harden it and make serial sections for the examination of the worms. This was done, and trichinæ were found in it.

On August 13th a differential count of 300 leucocytes gave polynuclears 43 per cent.; small mononuclears, 7.3; transitionals, 1.7; eosinophiles, 48. The boy was discharged August 20th, feeling quite well.

Case V.—Herman W., a German, aged twenty-seven years, was admitted Wednesday, November 9, 1898, complaining of thirst, heaviness of the limbs, and pain in the chest. There was nothing in his family history of special moment.

Personal History. He had been singularly free from illnesses; had been a temperate and very healthy man. During August of this year he had an attack of nausea and vomiting; no diarrhœa. He drinks very little milk, eats no oysters, and says he has been in the habit of eating raw and smoked pork, having used it on several occasions just before the onset of present illness.

Present Illness. Ten days ago, about October 30th, he began to have headache, which has persisted. He has also had alternate chilly and warm sensations, which would come on several times each day. He had some pain in the chest, with cough, and a feeling of heaviness and aching in the bones. On two occasions he had slight bleeding from the nose. During the first five or six days of his illness he vomited a good deal. He says that for a week he had no movements from the bowels; lately he has been irregular; has had no diarrhœa, but has had some soreness in the abdomen.

When admitted he looked like a healthy, well-nourished man, rather pale, and he was perspiring profusely. The temperature was 101.5°, and rose in the evening to 104°. The pulse was 100, full, bounding, and dicrotic; respirations 20. There was no glandular enlargement. There was slight puffiness of the eyelids in the early morning. The superficial glands seemed slightly enlarged, not tender. Examination of the heart and lungs showed no special changes. The abdomen was natural looking, on palpation everywhere soft, slight tenderness in the region of the navel. There were no rose spots. The spleen was not palpable.

On November 10th he looked rather dull and heavy. The temperature ranged between 102° and 104°. The Widal reaction was not present. The blood examination was negative for malarial parasites. On examination of the fresh specimen, Dr. Gwyn noticed an enormous increase in the eosinophiles. This, with our previous experience, at once called attention to the possible nature of the case. Then, on careful testing, it was noted that he had slight tenderness of the calf muscles.

November 11th the temperature ranged between 101° and 103°. The

CHART II. CASE V.

tongue was moist, with a thick coat. The abdomen was not distended, nowhere tender. At the left costal margin in the nipple line there was a slight reddening of the skin over an area about 3.5 by 2.5 cm. The spleen was not palpable. The patient complained of some stiffness of the legs, and there was slight tenderness on pressure in the calf muscles. There was no diarrhœa. He had perspired at night very profusely.

On November 12th there was still slight œdema of the upper eyelids, and on pressure the muscles of the arms and forearms, the pectorals, and those of the calves of the legs were quite sensitive, and he complained of a more or less constant pain in them. I noted on the 12th a slight swelling of the thyroid. The differential counts gave a leucocytosis on different occasions of from 14,000 to 17,000 per c.mm., and the eosinophiles from 22 to 36 per cent.

On the 13th and 14th he had loose, fluid stools, which were very carefully examined for adult trichinæ, with negative results. On November 14th a piece of the right gastrocnemius muscle was removed for examination.

On the 16th a note by Dr. Futcher reads: "Puffiness of eyelids not quite so marked. There is still considerable tenderness complained of. The temperature has been falling since the 11th, and for the past two days has ranged between 99° and 100°. There are no rose spots. The spleen is just palpable at the costal margin on deep inspiration. There is marked pallor of the face; lips and conjunctivæ are slightly anæmic." From this time on, the patient made very good progress. The temperature became normal on the 20th, and there have been slight elevations since to 100°. There has been slight tenderness of the muscles. The stools have been examined repeatedly, but have been negative for parasites; but on the 18th there were rather numerous Charcot-Leyden crystals.

On November 21st he complained of a good deal of stiffness of the legs.

On November 26th the prepared sections of the piece of muscle were ready for examination, and parasites were demonstrated in the specimens, in one section as many as four or five found. On December 14th, after the patient had been up and about for three weeks and had gained in weight and in color, the leucocytes were still about 20,000 per c.mm., and of them the eosinophiles were more than 60 per cent.

The symptoms in a case of sporadic trichinosis may be quite as distinctive as when a whole series of cases occur in rapid succession in a household or in a community. But this is not always so, and the remarkable discrepancy between the clinical and anatomical experience shows that we must frequently overlook the disease. The special interest of the small series of cases here reported rests with the fact that, while all were of moderate severity, the diagnosis was suggested by the blood examination and confirmed in each case by examinations of the muscle.

The clinical features of the disease are conveniently grouped into those associated with growth and development of the parasites in the intestines and those which follow the migration of the young brood into the muscles.

Gastro-intestinal Symptoms. Several days elapse after the ingestion of the trichinous pork before the larval muscle trichinæ reach their sexual maturity, and two or three days before the female gives birth to the embryos. During this period the patient frequently has severe symptoms—nausea, vomiting, and diarrhœa, with colicky pains in the abdomen. In large epidemics there have been a few cases in which the disease assumed a choleraic type.

The gastro-intestinal features of the five cases may be briefly summarized:

In Case I. there was no nausea or vomiting to speak of; no diarrhœa. Headache at onset and general diffuse pains in the joints, bones, and muscles were the chief complaints.

In Case II. there were loss of appetite, uneasy sensations in the abdomen, no nausea or vomiting, and the bowels were quite regular until the day of admission. He had headache, but not severely.

In Case III. the first complaint was of headache and cough. He vomited once, and for five days before admission he had diarrhœa, with griping pains in the abdomen. There were pains in the legs and arms and stiffness in the joints.

In Case IV. headache was an early and persistent symptom; he also had epistaxis; the bowels were regular; he had neither nausea nor vomiting; pains in the limbs were present.

In Case V. the patient vomited a good deal at the onset of the illness. He was constipated for a week, had no diarrhœa, but had slight soreness in the abdomen.

Practically, then, in these five cases the gastro-intestinal symptoms were not marked at the onset. In only one were they at all severe. This is in striking contrast to the records given in the epidemics of the disease, in which, as Niemeyer states, "the absence of intestinal symptoms, as well as of the severe attacks of vomiting and purging, is exceptional."

Symptoms of Invasion. Pains in the joints, bones, and muscles. All of the patients complained of irregular pains in the muscles and joints and back at the onset of the disease, more particularly of pains in the legs or of general heaviness in the limbs, and aching in the bones. These symptoms may be not more than those usually associated with an acute infection, and they are different from the pains subsequently complained of, which are confined more particularly to the muscles.

Of all the symptoms of invasion, fever is the one which is most apt to lead to error in diagnosis in the sporadic cases. This, with the accompanying phenomena of rapid pulse, headache, stupor, and general symptoms of serious illness, suggests to the physician the diagnosis of typhoid fever, as was the case in Zenker's patient. According to Strümpell, the temperature may for a time reach 104° or 106°, but

the fever is seldom continuous for any length of time, being usually interrupted by frequent and considerable intermissions. Niemeyer speaks of the fever as high, with slight morning remissions, and says that it very closely resembles the curve of typhus and other infectious diseases. He states, in addition, that occasionally the temperature curves can scarcely be distinguished from those of typhoid. Eichhorst speaks of the fever as chiefly of the remittent type, simulating very often the curve of typhoid fever.

In Case I. during the first five days in hospital the temperature presented only slight daily remissions. It ranged from 101.5° to 104.5°; then on the sixth, seventh, and eighth days it became very irregular, touching normal or near to it each day. Then for a week there was very slight fever, from 99° to 101°, after which the temperature remained normal for the greater part of the day, though for three or four weeks there was on some days a slight evening rise to nearly 100°. Altogether the temperature-curve in this case resembled very closely that of a mild typhoid fever.

Case II. presented a very remarkable temperature-curve. (See Chart I.) Several writers have referred to the intermittent form of fever in trichinosis, and this patient, as shown in the chart, had very typical paroxysms for the first four days. On the first day the temperature rose to 105.5°, and between 8 P.M. on the 15th and 10 A.M. on the 16th had fallen to normal. Then, without a chill, it rose in the afternoon of the 16th to 105°, and again dropped with a sweat to 97.7° by noon of the 17th. Two similar paroxysms followed on subsequent days. Then there was slight, irregular fever for six days, and the temperature reached normal and remained so. During convalescence he had very low morning temperature for several weeks; sometimes it was 96°, more frequently 97°. In this case the typically intermittent character of the fever made us at first suspect malaria.

Case III., the patient who really had the most serious local symptoms in the muscles, had a very moderate fever. On the second day after admission it rose to 103°; on the fifth day it touched normal; then there was for three or four days a slight rise to 100.5°. Then, after the eighth day in the hospital, the temperature remained normal. He also presented during convalescence persistent low temperature. For days in the four-hourly temperature-chart the fever did not rise above 97°.

In Case IV. the fever was very slight. For four days there was a little fever, the temperature ranging to 100°; then it became normal.

Case V. had a fever-range very suggestive of typhoid fever. (Chart II.) Shortly after admission it reached 104°, and the diurnal variations for three days were not more than 2°, in spite of the spongings, which were carried out under the belief that he had typhoid fever.

The temperature, however, did not touch normal until about the tenth day in the hospital, and he then had for three or four days a slight rise to 100° before it became quite normal.

The pulse-rate seemed to be dependent more upon the height of the fever.

The respirations were sometimes increased out of proportion to the fever.

In several points the similarity of the disease to typhoid fever is very striking. Of the features of onset, headache, general malaise, and pains in the bones and limbs are very suggestive. It will have been noted that headache was complained of very much by four of the patients.

More suggestive still are the gastro-intestinal symptoms—slight diarrhœa and pains—which were severe in only one case of this series.

Epistaxis was noted in Cases IV. and V. Altogether the symptoms of onset in all of the cases here discussed were those which we meet with in typhoid fever. With the exception of Case II., the temperature-curve also resembled typhoid fever. Enlargement of the spleen was met with in three cases, and, with the preliminary features spoken of, tended to confirm the diagnosis of typhoid fever.

Ehrlich's diazo reaction was well marked on admission in three cases, suspicious in one, absent in one on admission, but developed three days later. In one of the cases there were two "suspicious" rose spots.

There are in trichinosis three features of great value in diagnosis. Two of these are well known, and the third has been brought out by a careful study of the blood in these cases.

1. *The Muscular Pains and Swellings.* While in typhoid fever it is by no means uncommon to have aching of the limbs and back, it is exceedingly rare to have special complaint of pain in the muscles themselves. When pronounced, as in Case III., early in a febrile affection, this is one of the most suggestive symptoms of the disease, but it may be slight, as in Cases I., II., and V., and not enough to attract the particular attention of the attending physician, as in Case IV. In a very severe infection the swelling and hardness of the muscles, the extreme pain on pressure, the position of flexion of the arms and legs, without any redness or swelling of the joints themselves, are almost pathognomonic. Early in typhoid fever these pronounced symptoms in the muscular system are never seen. At the height or late in the disease, however, there may be swelling and tenderness of the muscles of the legs and, indeed, of the arms. I have referred to a number of such cases (*Studies in Typhoid Fever*, ii. pp. 399–401), which are probably examples of neuromyositis.

2. *Œdema.* In its most characteristic form this is seen in the eyelids and over the eyebrows, and it is of great value as a symptom, because of its very early appearance in trichinosis and because of its extreme rarity—or, rather, complete absence—in typhoid fever. It was

present in characteristic form, however, in four of our cases. In the hands and feet it is more commonly seen late in the disease. An important form is that which occurs over the affected muscles, as in Case III. The œdema, with slight erythema, above the swollen, tender muscles, was very characteristic.

3. *Leucocytosis and Eosinophilia.* So far as I know, the state of the blood in trichinosis has not received any special attention. For several years past Dr. Thayer has been making a careful study of the leucocytes in typhoid fever, so that in Case I., admitted March 3, 1896, when after two days the symptoms were doubtful, a careful blood count was made by Dr. T. R. Brown, at the time one of the clinical clerks, who found the leucocytes 17,000 per c.mm.—a point in itself almost excluding typhoid fever early in the disease. But, what was much more extraordinary, in making the differential count he noted a great increase of the eosinophiles; instead of a normal 2 per cent. solution there were 37 per cent.—a most remarkable and unusual condition of the blood. Nothing could be added to Dr. Brown's careful and elaborate study of the state of the blood and the changes in the muscles in this disease.[1] The eosinophilia persisted in this case, and the percentage reached, on April 23d, the extraordinarily high figure of 68.2 per cent. On that date there were 17,700 leucocytes, so that more than two-thirds of them were eosinophiles. When the patient left the hospital, on May 12th, the eosinophiles still formed 16 per cent. of the leucocytes.

While it seemed highly probable that the eosinophilia was definitely associated with the acute myositis, subsequent observations could alone determine how far it was of value in diagnosis. The case made, however, a very deep impression upon us all. But in so rare a disease as trichinosis we did not expect for some time to have an opportunity to confirm the observation. Scarcely a year later, however, when Case II. was admitted, with a remarkable intermittent fever without the presence of malarial parasites, and the eosinophiles were found to be on the day of admission 44 per cent. and the following day 67 per cent., we became suspicious of trichinosis, and a portion of muscle was excised and the parasites were found.

Seven months later a third case was admitted—a man who had typhoid fever only six or eight months before. After his admission eosinophilia was determined—48 per cent.—and we were again put upon the scent, and the diagnosis of trichinosis was confirmed by the excision of a portion of muscle.

During the present year, in Cases IV. and V., the blood count, showing an enormous increase in the eosinophiles, was the most important

[1] Loc. cit.

point in the diagnosis, confirmed in each instance by the removal of a portion of muscle. Our experience in these five cases is, I think, of very considerable clinical import. The eosinophilia was pronounced in each case and accompanied by a marked leucocytosis.

There now remains the interesting question whether in other forms of acute infectious myositis the eosinophiles are greatly increased in number. Such cases are extremely rare, much rarer, indeed, than trichinosis, and if eosinophilia does occur with it, the final decision would rest with the examination of the portion of muscle. In the recent monograph, by Lorenz, on diseases of the muscles (Nothnagel's *Handbuch*, 1898, Bd. xi.), the condition of the blood in polymyositis is not referred to except in a case assoicated with erythema multiforme. The leucocytes were 4900 per c.mm. No mention was made of their varieties. Under cocaine the removal of a portion of muscle is a simple operation; and with the ordinary scalpel, not the harpoon, a small bit can be taken from the biceps, with little or no discomfort to the patient. The special trichina compressor, such as is used in Germany in the pork inspection, may be used; or, if only a small portion of the muscle is excised, it is best, perhaps, to harden and make sections of the entire piece, in which way there is no possibility of overlooking even a single trichina.

Routine blood examinations have added enormously to the work of house physicians and of the clinical clerks. It requires a great deal of time, if done carefully and conscientiously; and when it comes to the question of differential counts of the leucocytes, if the service is at all heavy with acute cases, the added labor is really very serious. Should eosinophilia prove to be, as we believe, an important diagnostic sign of trichinosis, this labor will not have been in vain.

A CASE OF SYRINGOMYELIA WITH UNUSUAL SYMPTOMS.

AUTOPSY: MICROSCOPICAL EXAMINATION.

By William Norton Bullard, M.D.,

and

John Jenks Thomas, M D.,

BOSTON, MASS.

The ordinary types of syringomyelia are well known, and are so distinct and definite that in most cases the diagnosis is not difficult or involved. In the case I now present the symptoms did not even suggest syringomyelia, and the diagnosis, while reserved, seemed to be more probably of a quite different character.

The patient, a boy, six and a half years old, first came under my care (Dr. Bullard) in my service at the Carney Hospital on March 8, 1895, and from that time until his death he was under my observation.

The history, as obtained from the patient's mother, follows.

Family History. The father has been dissipated; he shows no evidence of syphilis. Now has pulmonary tuberculosis. There is no evidence of any disease of the nervous system in his family.

The maternal grandmother of the patient died of phthisis. The mother is healthy. Evidence of any disease of the nervous system in her family is absent. She has had no miscarriages. Has had two other children—a boy, eight years old, who is very nervous; is at times cyanotic about the lips, and is subject to nocturnal enuresis; and a girl who died of diphtheria. Family history otherwise negative.

Previous History. The labor was perfectly normal; no instruments were used; the head presented, and the child was not asphyxiated. His head, however, was noticed from birth to be of a peculiar shape.

As a baby he seemed perfectly natural. He began to cut his teeth at six months, to talk at ten months, and to walk at sixteen months. He had various diseases of childhood, but otherwise seemed perfectly healthy until three years old.

Since the age of three years he has suffered from attacks of frontal headache, which occured about every three weeks. For two years or more these attacks have been accompanied by vomiting, which sometimes seemed to relieve them. The vomiting has no direct relation to the ingestion of food. Both the vomiting and the headaches have gradually become more frequent, and for the past five or six weeks have occurred almost every day. Last January it was noticed that his sight was growing poor, and at this time he was taken to the out-patient department of the Boston City Hospital for treatment.

He then complained principally of the headaches and vomiting. The sight rapidly grew worse, and for a few weeks he has been totally blind.

About five years ago—date uncertain—he fell ten feet, striking his head on the stairs. He did not lose consciousness, but was dazed for a few moments. No special symptoms were noted afterward. He went out the same day and walked well. The headaches and vomiting existed previously.

About the 1st of January, 1895, he began to have attacks of dizziness in which he would fall, but did not lose consciousness. His mother thinks that he usually fell backward and to the right. About January 28, 1895, he had a spasm in which his head was thrown back. There was no loss of consciousness. His eyes were open. There were no spasmodic movements of the extremities. Disturbance in gait was first noticed early in January, 1895, when it was observed that he staggered in walking.

His general condition when seen at that time was good. He ate well and slept fairly, but had attacks, said to be "pavor nocturnus."

On February 1, 1895, while in the Boston City Hospital, he had an "epileptic attack," in which he began to beat his head with the right hand, then with both hands, and at the same time to move his right leg. He was unconscious during the attack, which lasted about twenty minutes.

Present Condition. He is bright and intelligent, and his memory is unimpaired; he has always learned easily and remembers what he

learns. His gait is staggering, and his knees seem to give way under him. There is no incontinence of urine or feces. His appetite is good and his bowels regular. Temperature 99°, pulse 60.

Physical Examination. He is well developed and well nourished. There is a depression of the right parietal bone about the middle of the vertex, just external to the sagittal suture; there are no cicatrices over the scalp. He is totally blind; the pupils are dilated and do not react to light or accommodation. There is possible slight paresis of the left abducens, as the left pupil does not move outward to the full normal extent. Actual paresis of the right abducens exists; the right pupil does not pass outward much beyond the median line. There is no ptosis and no other evidence of any affection of the third nerves. On conjugate movement both eyes turn inward to the full extent. Hearing is normal; there are no ear symptoms. There is no paresis of the face. The tongue is normal, as is the soft palate. The heart, lungs, and abdominal organs show no abnormal signs. The spine is normal. The epiphyses at the wrists are somewhat enlarged; there is no marked rosary. The limbs appear normal, and the grasp is good. The knee-jerks are normal, and ankle clonus is not present. There is no tenderness over the lower extremities. Sensation is normal.

The urine contains no albumin or sugar; it is slightly acid; specific gravity 1020. Alkaline phosphates increased.

The sensation was examined three times—once by Dr. Thomas at the City Hospital in January, and twice at the Carney Hospital—once by Dr. Bullard personally—and was on each occasion found to be normal. It is doubtful, however, whether it was tested for heat and cold.

March 10, 1895. Dr. Kilburn reports: "Optic atrophy o. u. secondary to papillitis of intense severity. Retinal veins much congested and distorted. Retinal arteries greatly shrunken." In January Dr. Lancaster reported: "Subsiding optic neuritis and beginning optic atrophy in both eyes." The sense of smell was not impaired.

20*th.* He is comfortable except for occasional headache. Has vomited at times with the headaches.

28*th.* Occasionally wakes up at night with a loud cry.

April 22*d.* No material change. Lies in bed most of the time. Suffers little pain.

May 1*st.* Has improved since admission. Vomits less frequently and walks better, staggering less.

June 6*th.* Gets up every day, and is about the ward. Bright and cheerful.

August 1*st.* Severe occipital headache. Head much retracted.

28*th.* Very obese. No pain. Runs about ward. Eats and sleeps well.

September 2*d.* Discharged relieved.

On the next day, *September* 3*d*, he was admitted to the Children's Hospital. No special new facts were recorded in the history. At that time it was again noted that he was very fat. The knee-jerks were normal. There was no incoördination.

7*th.* Seen by Dr. Bullard, who reports: "No indication for operation."

12*th.* Attempted to walk down the ward; his steps became uncertain; he fell, and, although conscious when picked up, he soon became unconscious, and remained so one-half hour. During unconsciousness pricking with a knife caused movement except when done below the knees—

here there was no reflex, even when the knife was thrust through the skin.

14*th*. Headache this afternoon. More sleepy than usual.

17*th*. Has complained of being tired, and has lain down most of the morning. This afternoon, while walking, his legs became a little shaky, and he would have fallen if he had not been caught. When placed upon his feet he held his legs stiff, and if unsupported tended to fall in any direction, like a stick.

Intelligence retained. Said that he did not feel dizzy, and was "all right, except that his legs were weaker."

21*st*. Headache. Seems well otherwise.

28*th*. Headaches more frequent. Frequently unsteady when upright.

October 3*d*. Headaches continue, and when they are present the boy is often stupid, and there are frequent vasomotor disturbances. Skin scarlet, sometimes all over the body, sometimes in blotches.

15*th*. No change.

28*th*. Every two or three days he stays in bed for the whole or part of the day on account of the headaches. Lies then on his side with his head very much retracted, and cries. Frequently shrieks with pain.

November 19*th*. Discharged.

April 16, 1896. Was readmitted to Children's Hospital. The symptoms are unchanged. He is still subject to the headaches and vomiting. The headaches may occur two or more times a day; but he is sometimes free from them for a week or more. There is frequently retraction of the head with the headache, and he sleeps with his head retracted. Is apt to cry out in his sleep. Walks easily, but staggers somewhat. Appetite good. Bowels regular.

Physical examination shows no special change except that there is now decided exophthalmos, with almost constant motion of the pupils, which react slowly to light. The patellar reflex is now absent. There is no paralysis of any limb and no incoördination of any of the extremities. The internal organs are normal. Urine normal.

27*th*. Ears examined by Dr. H. L. Morse, who found there was no central affection of hearing. There had been a slight reddening of the drum and canal.

Left facial paralysis affecting the mouth, cheeks, and eye was noticed to-day.

Lumbar puncture was attempted, but no fluid was obtained.

May 23, 1896. The facial paralysis is apparently intracranial. No reactions of degeneration were obtained. (Dr. Thomas.)

25*th*. Discharged.

On readmission, *December* 11*th*, he was more stupid than formerly and very obese. Uses upper extremities well. Sent from Kindergarten for the blind, where he has been living, because headaches and vomiting have lately been more frequent, and he has attacks of weakness, during which he cannot walk and has to be carried. Now has frequent flushings of the face.

16*th*. Hears watch in left ear on contact; in right ear at six inches.

Left internal strabismus. He has no dizziness now, but cannot walk on account of weakness.

17*th*. Reacts normally to galvanism. No degenerative reaction.

The obesity was now so marked that thyroid extract was given, but without effect. The eyes were very prominent, but there was no goitre.

January 21, 1897. There is now paralysis of the lower extremities, which has reached such an extent that the child cannot stand.

22*d*. Cannot raise himself in bed, nor can he raise his legs. Knee-jerks absent since April, 1896.

23*d*. Incontinence of urine and feces. Can move hands and arms, but there is loss of motion of the facial muscles. Complete sensory paralysis as high as the second ribs and over the inner surface of the arms.

27*th*. No change until to-day, when he had headache and paresis of the arms, which passed off during the day. Exophthalmos increasing; left eyelid does not close over the eye. General myxœdematous condition of the skin. Sleeps a great deal.

29*th*. Speech is normal. Sensation returning to legs and trunk; motor paralysis continues.

February 7*th*. Headache for the last three or four nights, not relieved by morphine.

After this practically no change occurred until March 1st, when a small slough appeared over the coccyx. During the next three weeks other sloughs appeared over the trochanters and the right anterior iliac spine. Skin elsewhere more natural in appearance. From this time on the ulcers slowly healed, but there was otherwise very little change in his condition.

July 25*th*. There is now left internal strabismus. The facial paralysis has disappeared. There is, however, total paraplegia of the lower extremities. The thighs are drawn up on the abdomen and the legs are flexed on the thighs.

August 6*th*. Transferred to-day from the Children's Hospital to the Carney Hospital. The general condition is much the same as before. The mental condition has always been good, the mind clear, and, in spite of his pain and blindness, the patient has been uniformily cheerful and sweet-tempered.

There is no paresis of the face. The tongue, which is not tremulous, is protruded straight. The upper extremities are not affected in any way. There is total paraplegia of the lower extremities, with flexion at the hips and knees. Incontinence of urine and feces. Ankles and feet œdematous. Bedsores as above noted. Urine negative.

The patient continued in much the same condition—cheerful, contented, and with fair general strength—until October 18th, when he began to breathe heavily, became comatose, and died.

The autopsy made by Dr. Thomas showed:

Body of a boy apparently about ten years old. Panniculus adiposus well developed. Rigor mortis marked. Dependent portions of the body livid. A large ulcer, 10 to 12 cm. in diameter, over the sacrum.

Abdominal cavity normal. The mesenteric lymph-nodes are enlarged, many of them being 1 cm. or more in longest diameter. On section they are reddened.

Pleural cavities and pericardium normal.

Left lung œdematous, but otherwise normal. In the posterior portion of the lower lobe of the right lung there are several small, reddish-gray areas, firmer than the normal portions of the lung, varying in diameter from 2 cm. to 5 cm. From the cut surface a frothy fluid can be squeezed in small amounts.

Heart-valves and cavities normal.

Spleen slightly enlarged; dark-red on section. Trabeculæ and follicles distinct.

Stomach normal.

Intestines. In the lower part of the ileum there are six or eight small ulcers, nearly circular, about 1 cm. in longest diameter, with fairly clear-cut borders and reddened bases.

Bladder is normal and contains about 100 c.c. of cloudy urine. Kidneys are normal in size. Cortex injected. Glomeruli fairly distinct. Capsule peels readily.

Pancreas and suprarenals normal.

Brain. Surface moderately injected. The ventricles are considerably enlarged and filled with clear fluid. The iter is markedly dilated, as is also the fourth ventricle. Otherwise the brain appears normal.

There is no tumor to be seen on section of the cerebrum or cerebellum.

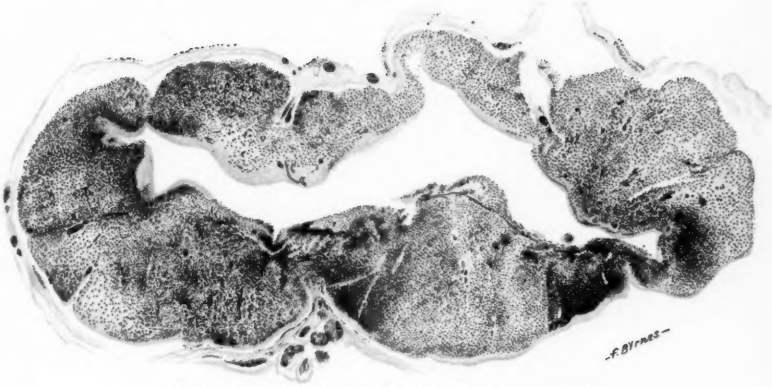
Cord. The cord is larger than normal. The membranes are not injected and appear normal. On section of the medulla and cord there is seen to be a cavity in the gray matter, beginning in the median line posterior to the central canal at a point a little above the upper olives. This cavity seems to have no communication with the central canal. At the level of the lower part of the pyramidal crossing there can be seen three cavities grouped about the central canal, one posterior and one on each side. About 1 cm. below the pyramidal crossing the single cavity broadens out and extends across the commissure, and on the left side extends well back into the posterior horn. Just below this there are two cavities, one in each posterior horn. The right cavity ends at the level of the first cervical segment. The left cavity continues in the left posterior horn, increasing in size to the second cervical segment. In the next segments the cavity occupies the same position, but is larger, until at the fifth cervical segment it is a large space occupying the position of the commissure and both posterior horns, and distorting the cord. At the seventh cervical segment the cavity attains its largest size, leaving but a thin strip of cord tissue about it. From the fifth cervical to the first dorsal segment the central canal is lost. Below the seventh cervical segment the cavity, still occupying a central position, grows smaller, and at about the first dorsal segment splits into two cavities, one occupying the centre of the cord, with a smaller one to the left.

At the second and third dorsal segments there are two distinct cavities, one in each posterior horn—the left cavity the larger. At the fourth and sixth dorsal segments the left cavity becomes larger, extending across the median line in the gray commissure and into the base of the right posterior horn. The cavity in the right horn is smaller, and at the sixth dorsal segment the two cavities have united, forming one large one. At the eighth dorsal segment there is again a division into two large cavities. At the ninth dorsal segment the left cavity is larger and extends across the median line. The right cavity below this gradually diminishes in size and cannot be distinguished at the second lumbar segment. The left cavity enlarges considerably below the ninth dorsal segment, and although it again diminishes in size at the first lumbar segment it can be distinguished to about the level of the fourth lumbar segment.

Microscopical Examination. A section 5 mm. thick was taken through the middle of the cerebellum, divided into small pieces, and stained with

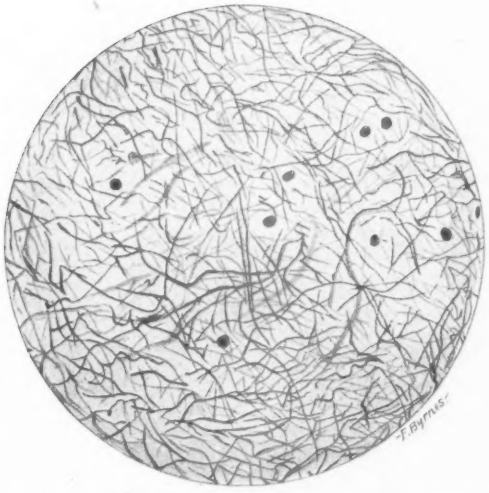
PLATE I.

FIG. 1.



Section from Level of Sixth Dorsal Segment.

FIG. 2.



Neuroglia from Border of Cavity. Zeiss: Oil Immersion; 2 mm.; Ocular 3

hæmatoxylin and eosin, but nowhere did the sections show an increase of nuclei or anything approaching the structure of a new growth. Sections of the cord were made at various levels and stained by Weigert's myelin-sheath stain, Pal's modification of this followed by Van Gieson's picric-acid and acid-fuchsin stain, by phosphotungstic-acid-hæmatoxylin, and by Mallory's method for staining neuroglia.

The sections at the level of the seventh cervical segment show a marked distortion of the cord, the centre being occupied by a large, irregular cavity, which has a border of moderate thickness, staining very poorly with connective-tissue stains. When stained for neuroglia the results are also poor, but in some of the sections the border of the cavity is seen at places to be made up entirely of a dense mesh-work of neuroglia fibres, with comparatively few nuclei. Many of these fibres are considerably thicker than the normal neuroglia fibres of the cord. Probably the reason the fibres stain so poorly, as a rule, is because of the length of time which elapsed after death before the removal of the cord. This cavity evidently occupies the whole of the posterior commissure and the posterior horns of the gray matter of the cord. It is not lined with epithelium. At this level the central canal cannot be made out. The substance of the cord is much distorted. The anterior horns are distorted and flattened, but show a good number of nerve-cells which are practically normal, though some are distorted in shape, and others appear smaller than normal. Occasionally a nerve-cell, very slightly changed, with distinct nucleus and nucleolus, can be found embedded in the neuroglia about the cavity. The posterior part of the posterior horn is also fairly normal, though much flattened and distorted. The white substance of the cord in all parts shows a diffuse and very marked degeneration of fibres, with loss of the myelin sheaths. This is most marked, however, in the lateral and anterior pyramidal tracts and in the median portion of the posterior tracts (columns of Goll), where there is scarcely a single normal nerve-fibre. There is, however, a marked degeneration in all the remaining portions of the white substance at this level.

There is a considerable increase of the neuroglia throughout all the white matter of the cord. The anterior and posterior nerve-roots appear practically normal. The membranes are moderately thickened by increase of fibrous tissue.

Sections from the upper dorsal region about the level of the second dorsal segment show the two cavities, one in each posterior horn, each extending well up to the commissure, but not into it. The central canal is normal. The posterior horns are nearly destroyed; distorted remains of the substance of Rolando only can be distinguished—more plainly on the right side. The anterior horns are distorted and flattened, but show about the normal number of nerve-cells, which are practically normal. The degeneration of the fibres of the white matter is very marked in the pyramidal tracts. The anterior ground-bundles and the antero-lateral tracts show a diffuse atrophy, but contain more normal fibres than any other part of the cord. There is also a diffuse atrophy of the posterior tracts, most marked toward the posterior fissure, where most of the fibres have disappeared, and slighter atrophy at the part of the columns lying next to the posterior horns. The nerve-roots are normal. The membranes are somewhat thickened.

Sections from the lumbar enlargement show a cavity in the left pos-

terior horn, quite large at the base of the horn and running down as a narrow slit three-fourths of the distance to the tip of the horn. This horn shows a marked absence of the normal nerve-fibres in the gray matter itself and of those passing out into the posterior columns. The right posterior horn appears normal. The central canal is normal, as are also the anterior horns. The atrophy of nerve-fibres is marked in a band along the border of the anterior part of the cord, broadening out at the lateral part of the cord, so as to include the whole of the pyramidal tracts. The fibres of the anterior and lateral white matter of the cord appear nearly normal. There is a well-marked, diffuse, and fairly uniform atrophy of the fibres of the posterior columns. The nerve-roots appear normal, and the membranes are moderately increased in thickness by an increase of fibrous tissue.

Sections of the upper part of the sacral region of the cord show only a marked atrophy of the lateral pyramidal tracts and a slight, diffuse atrophy of the posterior columns.

Sections at the second cervical segment above the point of greatest dilatation of the cavity in the cord show the large cavity in the centre extending well to either side. At the centre of the anterior border of the cavity the epithelial cells of the central canal are seen. The cord is flattened and distorted. There is a well-marked atrophy of the border of the lateral portions of the cord, beginning near the posterior horns of the gray matter and extending well forward toward the anterior fissure. The posterior columns are markedly degenerated, with the exception of a portion lying next to the posterior horns—probably the posterior root zone—and a portion of the column of Burdach, though on account of the distortion the extent of the normal and degenerated areas cannot be exactly determined. The gray matter of the cord appears practically normal except for its distortion.

A section at the upper part of the pyramidal crossings shows a cavity irregularly quadrilateral in shape, with borders of proliferated neuroglia tissue lying just posterior to the central canal, which is normal. The section shows no atrophy of nerve-tracts, and the gray matter appears normal.

Sections of the medulla at the level of the lower part of the fourth ventricle show some distortion resulting from dilatation of the ventricle. The wall of the ventricle shows an increase of the normal neuroglia. The medulla itself appears normal, except for the distortion.

Anatomical Diagnosis. Hydrocephalus, with dilatation of the lateral ventricles, the fourth ventricle, and the iter; syringomyelia; bronchopneumonia; ulcerations of the ileum; acute lymphatic hyperplasia of the mesenteric lymph-nodes; decubitus.

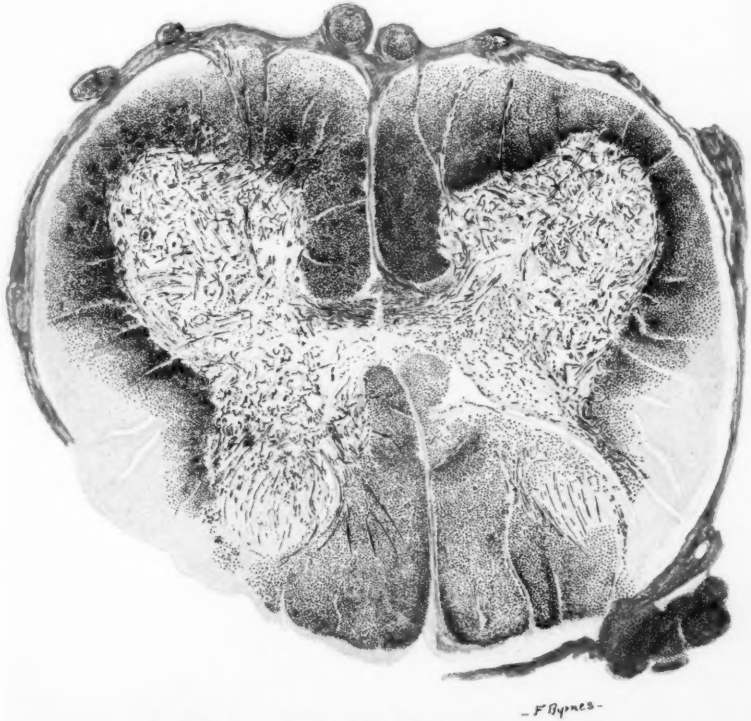
Summary. There is marked dilatation of the ventricles, including the fourth and the iter, resulting from the hydrocephalus. The branching cavity in the cord seems to originate in the gray matter and not to be a diverticulum of the central canal, although at the point of greatest dilatation of the cavity in the lower cervical region the central canal opens into and becomes a part of the general cavity. The absence of dilatation of the central canal above the point of communication with the cavity precludes the supposition that the latter was produced at this point by the increased pressure. Above the point of greatest dilatation of the cavity there is an ascending degeneration of the direct cerebellar

PLATE II.

FIG. 1.

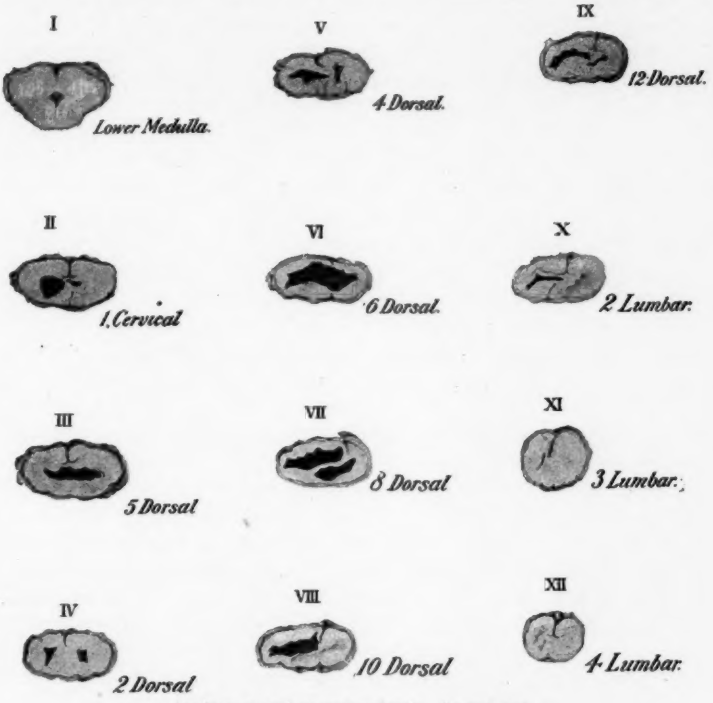
Section from Level of Sixth Cervical Segment.

FIG. 2.



Section from Level of Third Lumbar Segment.

tract, the tract of Gowers, and the posterior columns. Below this point there is a marked degeneration of the direct and crossed pyramidal tracts and a diffuse atrophy of the posterior columns, less marked than in the upper cervical region, undoubtedly caused by the presence of the cavities in the posterior horns. There is also a well-marked atrophy of



Sections of cord at various levels. Natural size.

the tract of Gowers. At the point of greatest dilatation of the cavity there is an extensive degeneration of all the fibres of the white matter of the cord and marked distortion of the gray matter, in which, however, fairly normal nerve-cells are found in moderate numbers. There is a diffuse increase of neuroglia fibres in the atrophied tracts and a marked neuroglia proliferation about the cavity in the cord.

RÉSUMÉ. A boy previously healthy and of fairly healthy antecedents becomes, when three years old, subject to attacks of headache of much severity, lasting an hour or more. These are soon accompanied by vomiting, and tend to increase in frequency and severity. This condition continues three years, growing gradually worse, and at the end of that time staggering is noticed, and a severe double optic neuritis

appears, which soon produces double optic atrophy and nearly total blindness. The headaches, vomiting attacks, and blindness now continue much the same for nearly two years—the remainder of the patient's life. At times the pain and prostration are such that he stays in bed for days or weeks at a time, then improves and is able to be up and about like a healthy child. There is during this time a great increase in the general adipose tissue, so that the patient becomes obese, and to this condition are later added exophthalmos and an appearance suggesting myxœdema. These two latter symptoms, however, disappear after a month or two. During the first part of this time (in March, 1895) there were apparently some temporary pareses of certain eye-muscles—both external recti—and nystagmus, which later were not found. There were no further changes in the symptoms until, about ten months after the blindness began, there was a sudden attack of paraplegia. This paraplegia remained permanently, and the lower extremities were drawn up and held flexed. Incontinence of urine and feces came on at the same time, and was permanent. At the same time there appeared a paralysis of the left face and some weakness of the upper extremities, but these soon disappeared. Bed-sores developed, but later improved, and the child was in good general condition, although the obesity had somewhat diminished at the time of death. This occurred from an intercurrent affection—typhoid fever.

This case is of interest because, clinically, it presented none of the typical symptoms of syringomyelia. There was no early paralysis or weakness of the limbs. There was no atrophy or other trophic disturbance. There was no apparent anomaly of sensation. We cannot positively state that there was no anomaly of sensation at any time preceding the paraplegia, when there was anæsthesia as high as the second rib around the trunk, but no abnormal change in sensation was found on examination in 1895, and later nothing in this regard was noted, the symptoms being of such a character that no special attention was directed to this point. There were none of the evidences of altered sensation sometimes found in cases of syringomyelia, such as insensibility to wounds or burns. There were no typical changes of the ordinary character found in this affection. There was no scoliosis.

On the other hand, we found a series of symptoms totally unrelated to those of typical syringomyelia. They were supposed at the time to be due to a chronic hydrocephalus, and undoubtedly were so.

Later came the paraplegia of sudden onset, with paralysis of the sphincters and anæsthesia of the trunk and limbs below a given level. While such symptoms are known to occur in syringomyelia, possibly in consequence of an acute breaking down of tissue from hemorrhage or other cause, they are by no means characteristic of this disease.

The occurrence of syringomyelia in company with hydrocephalus has

been noted not rarely. Hinsdale says fifteen cases out of one hundred and fifty presented this association.

It may be advisable in the future to distinguish a hydrocephalic type of syringomyelia in which the hydrocephalic symptoms are the only prominent ones in the early and middle stages.

In cases of chronic hydrocephalus of unknown origin in young children the existence of syringomyelia with the hydrocephalus should not be overlooked.

CHOLECYSTITIS COMPLICATING TYPHOID FEVER; TAPPING OF GALL-BLADDER; CHOLECYSTOTOMY; DEATH.

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Of late a good deal has been written about the association of cholecystitis with typhoid fever. The following case has occurred recently in Professor Osler's service at Johns Hopkins Hospital:

K. T., colored girl, aged twenty-four years, single, admitted to the hospital on September 15, 1897, complaining of "feeling sick" and out of breath. The following notes were recorded:

Family History. Negative.

Past History. Patient had measles, whooping-cough, scarlet fever, chicken-pox, mumps, and diphtheria. Patient is rather indefinite about malaria and typhoid fever; the latter she thinks she had between the age of nine and ten. Past history otherwise negative.

Present History. Three weeks ago she had a headache and a chill; was out of breath on the least exertion. Following the chill there were vomiting and epistaxis. She has had a chill every day, and sometimes twice a day, since the onset. The chill was usually in the morning. Since the onset the shortness of breath has been a marked feature. She has had occasional pains in the pit of the stomach, but these seem to have disappeared in the last few days. Slight cough, with a sticky, blood-tinged expectoration, began yesterday. Last night, after drinking some milk, she vomited immediately. In the last two weeks thinks that she has vomited about a dozen times.

We therefore have a condition of three weeks' duration; onset with headache, epistaxis, and vomiting. Shortly after the onset a chill, occasional abdominal pain, and at the last a slight expectoration.

On admission, at 6 P.M. on the 15th, the temperature was 102.8°. The following is the note made by Dr. Pancoast: Patient on her back, expression anxious, respiration 40 to the minute. Respiratory movements both abdominal and thoracic. The examination of the lungs,

beyond a few fine crepitant râles heard over both fronts, was quite negative, as was also the heart.

The abdomen natural looking, not tender; distinct respiratory movements; spleen not palpable. Examination of sputum showed no tubercle bacilli, numerous cocci.

On the 16th, the day after admission, note by Dr. Osler is: Temperature 104°; pulse 112, small; respirations 40. There seems to be a little pleural rub over the right back. *Abdomen not distended, not tender, no tension* Patient had to-day thirteen stools, of an intense green color, watery, composed chiefly of flakes of mucus; no pus, *no amœbæ* seen. Each stool was about five ounces. There was no griping.

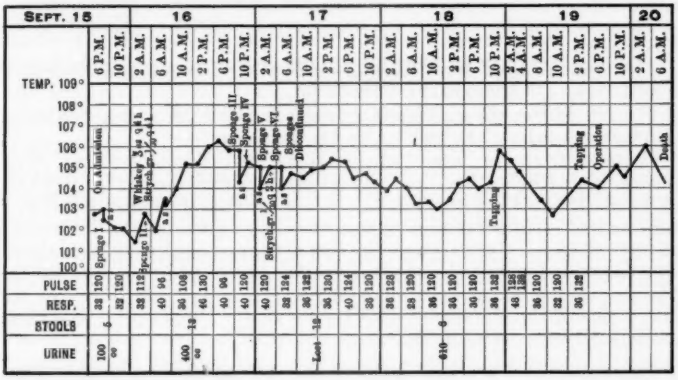
On the 17th the note was: Patient quite rational; respirations not labored, fairly deep. Pulse of good volume, 32 to the quarter minute, not dicrotic; lungs clear, no tubular breathing. Abdomen looks natural; spleen not palpable; *no tenderness;* no gurgling. Leucocytes 6300. Patient feels fairly comfortable; *has no pain;* is hungry. The diarrhœa continues to-day; stools of much the same character as yesterday.

September 19th (note by Dr. Pancoast): The sclera appear to be a little yellow. On placing the hand on the patient's abdomen tenderness on pressure was noticed for the first time, and further examination showed that the right upper quadrant of the abdomen was particularly sensitive. No sensitiveness in right inguinal and iliac regions. In the right upper quadrant there was a definite resistance, and a distinct mass was felt. Abdomen everywhere tympanitic, except in the right upper quadrant, where on gentle percussion the note was dull.

Dr. Pancoast reported this condition at once, and the patient was seen by Dr. Cushing and myself. The right hypochondrium was found to be exquisitely sensitive. The patient was in a moderate sweat, and on palpation, about 9 cm. below the costal margin and about 3 cm. from the umbilicus, there was to be felt a rounded, fairly resistant mass. In view of the fact that the patient had had profuse diarrhœa, the thought of amœbic abscess was entertained. The Widal reaction, however (taken by Dr. Block), was well marked at a dilution of 1 to 70. The continued fever, the gradual onset, typically typhoidal, and the occasional association of cholecystitis with typhoid led us to suspect a distended gall-bladder. The advisability of an operation was considered, and in order to ascertain definitely what the nature of this tumor might be we decided to make an exploratory puncture. About 10.30 P.M. on September 19th I inserted a long hypodermic needle directly into the tumor mass and drew off about 15 c.c. of a clear, urine-like fluid. Our object was merely to make the diagnosis with a view to operation. The needle was therefore withdrawn. I regret exceedingly, however, that several ounces of the fluid were not drawn off. The examination of the cover-slips showed numerous actively motile rod-shaped bacilli, several in chains, extending across the field. The picture was very suggestive of typhoid bacilli. Cultures were immediately made by Dr. Block. Inasmuch as there was no evidence of a purulent cholecystitis, Dr. Cushing advised deferring the operation in the hope that the condition might clear up spontaneously.

Directly after the aspiration the patient was very much more comfortable, turned on her side, and slept for two hours. Later, however, the distress returned. I saw Dr. Cushing again, and it was decided that we should operate at our first opportunity.

I saw the patient again with Dr. Pancoast on the morning of September 20th. Her condition was very bad for operation. There was still great tenderness in the right hypochondrium, and she was apparently suffering. So striking was the relief after aspiration in Mason's case, of which I shall speak later, that I was tempted to make a second puncture, with the hope of drawing off more of the fluid and thus preventing rupture, which seemed imminent; also removing the necessity of operating. The tumor mass, however, was not to be felt. I inserted the needle at the same point as the former puncture, but there was obtained only a small amount of blood. After consultation with Dr. Cushing, it was decided to operate immediately.



Report of Dr. Cushing's operation: Linear incision 10 cm. from the site of the gall-bladder tumor. The edge of the liver extended 5 cm. below the costal margin. A small bleeding point on its surface, about 2 cm. from the edge. A little blood and fluid in fossa, made by liver, duodenum, etc. Cover-slips showed rod shaped bacilli and polynuclear leucocytes. The gall-bladder greatly distended, very tense. The surface had a dark, dull green color; bloodvessels on the surface injected; *a few fine, fibrous shreds on the surface over the lappet of liver;* 120 c.c. of fluid were aspirated after the gall-bladder had been loosely attached to the abdominal wound. The fluid aspirated corresponded exactly with that drawn off last night. On opening the gall-bladder there was found to be no necrotic area. A drainage-tube was inserted and the wound partially closed and packed with gauze. The patient was returned to the ward, and did fairly well until midnight, when vomiting took place. She gradually sank and died early on the following morning.

Autopsy (Dr. Livingood). Conjunctivæ jaundiced. Parietal layer of peritoneum smooth and glistening, nowhere adherent. Vessels are deeply congested. Visceral peritoneum smooth and glistening; fluid covering the surface somewhat viscid, uniformly icteroid. Delicate fibrous adhesions between the upper surface of the left lobe of the liver and the diaphragm. The gall-bladder contains some clotted blood, no

gallstones, no evidence of obstruction; mucous membrane not ulcerated. The spleen weighs 340 grammes, is large, regular in shape, of a deep maroon color—a typical typhoid spleen. The liver excepting the thin layer of fibrin noted above is quite normal.

Intestines. Duodenum bile stained, mucous membrane normal; upper portion of jejunum normal. The first Peyer's patch involved was about the middle of ileum; it is small and slightly congested about the edge. From this point on the patches are more elevated and congested, becoming gradually more deeply congested, and show the beginning of ulceration. In the colon there are many minute ulcers with congested margins, the largest ulcer measuring 1 cm. in diameter.

The greatest interest of this case centres about the bacteriological examination. The following cultures and examinations were made:

The aspirated fluid from the exploratory puncture. Examined by Dr. Block

The fluid removed from the gall-bladder at operation and from peritoneal surface. Examined by Dr. Young.

The fluid from the gall-bladder at autopsy and from the peritoneal surface at autopsy. Examined by Dr. Livingood.

Cultures from the bile, made by Block and Young on agar, milk, potato, glucose-agar, bouillon, and gelatin, showed the typical typhoid characteristics. Cultures were also made by Young on agar slant from a sponge which was inserted deep in the iliac region in the abdominal cavity. These cultures gave the same characteristics as the above. Dr. Livingood obtained the same results, and in addition obtained the Malvoz reaction—that reaction in which there is agglutination upon the association of typhoid bacilli with formic acid. These bacilli, and these alone, agglutinate with formic acid.

The following is a report of the bacteriological findings, kindly given by Dr. H. H. Young:

Cover-slips from fluid aspirated from gall-bladder showed bacilli like typhoid. Two Petri dish agar cultures made from fluid aspirated at operation. Eighteen hours later abundant but well-isolated colonies, opaque, gray, moist; microscopically, bacilli like typhoid; all colonies of same character. Agar slant made form a single colony, confluent, grayish-white, moist, semi-translucent; bacilli very motile.

From this:

Milk: slightly acidified after many days, not coagulated.

Potato: meagre, thin, white growth.

Glucose-agar: no gas formation after many days; abundant growth.

Bouillon: clouded.

Hanging drop: very motile bacilli.

Gelatin: no liquefaction; finely granular yellow growth.

Diagnosis: Bacillus typhosus, pure.

Culture on agar slant made from sponge which was inserted deep into the iliac region of abdominal cavity gave well-isolated colonies similar to those from the gall-bladder; these gave the same growth and reaction as above; the bacilli very motile.

Diagnosis: Bacillus typhosus.

I find the literature on this subject very fully treated of in Dr. Osler's "Hepatic Complications in Typhoid Fever," and also in Mason's "Gall-

bladder Infections in Typhoid Fever," published in the *Transactions of the Association of American Physicians* for 1897.

HISTORY. Louis, in 1836, appears to have been the first to call attention to this association of cholecystitis with typhoid fever. Andral and Grissolle also make mention of the same association. Rokitansky (*Pathological Anatomy*, p. 160) makes the following statement: "We have noticed the occurrence of the secondary and gangrenous typhoid process on the mucous membrane of the gall-bladder." A case was reported by Ayres in 1846 (*New York Journal of Medicine*) in which perforation of the gall-bladder occurred in continued fever.

Although a number of cases have been reported, it is only since accurate bacteriological examinations have been made that the typhoid bacillus has been shown to be the active agent in exciting the cholecystitis.

In 1896 Gilbert and Girode reported a case of purulent cholecystitis associated with typhoid fever. From the pus from the gall-bladder pure cultures of typhoid bacilli were obtained. This was five months after the fever. Dupré appears to have been the first to obtain the bacillus during the progress of the fever. His first case, reported in 1891, died on the sixteenth day. His second patient died six months after the fever, following an operation for gallstones. Guarnieri also reports (1892) the finding of the bacillus in the contents of the gall-bladder. Chiari's and Flexner's reports are perhaps the most valuable. The former found the bacillus in twenty out of twenty-three cases; the latter in seven out of fourteen cases. We have collected forty cases in which a bacteriological examination has been made, in thirty-four of which typhoid bacilli were found.

METHOD OF INFECTION. It becomes a question of immediate interest as to how these bacilli reach the bile passages. There are four channels: 1. Through the intestinal wall. 2. Directly from duodenum through bile passages. 3. Through the liver. 4. Through the portal system. Satisfactory experimental evidence is lacking to prove conclusively any one of these to be the invariable path of infection.

The normal bile is sterile. If there be any obstruction to the outflow of bile, organisms rapidly develop within the gall-bladder. Within twenty-four hours after ligation of the common duct, as shown by Charcot and Gombault, the bile contains numerous organisms. Sherrington has shown that only when the blood is contaminated by the poisonous products of bacteria could they pass through the hepatic tissue. These experiments suggest the possibility of two sources of infection: from the duodenum, producing inflammation of the ducts and obstruction of the bile, rendering the gall-bladder a suitable place for the development of pathogenic organisms; through the liver from the blood, the hepatic tissues having been lowered in their resistance by the poisonous products

of the typhoid bacillus. This latter will be borne out by the fact that in none of the cases reported in our table has this condition been detected earlier than the twelfth day. The presence of typhoid bacilli in the gall-bladder ten to twelve days after intravenous inoculation, as done by Blackstein, would again bear out the experiments of Sherrington. We may therefore conclude, from experimental as well as from clinical evidence, that the source of infection is twofold: from duodenum through bile passages; from blood through hepatic tissues.

Chiari's suggestion that the typhoid bacillus makes a habitat of the gall-bladder is an interesting one, inasmuch as an increased flow of bile which follows active feeding may account for a relapse. The rationale of a careful diet may here be seen. It is a common experience that a return to full diet may be followed by a slight rise of temperature or even by a definite relapse.

SYMPTOMS. A study of the collected cases brings out several valuable facts. The age would of course correspond with that at which individuals are most frequently attacked by typhoid—*i. e.*, twenty to thirty.

Of more interest is the day of disease. From the tenth to the thirtieth day is by far the most frequent period, and of these the twenty-first to the thirtieth has the majority; eight of these cases occurred on the twenty-first and one on the twentieth.

The symptoms present no regularity. Pain would appear to be the most constant. Out of twenty-five, of which we have full notes, nineteen had pain at the onset. The significance of Holscher's twenty-two jaundiced cases out of 2000 autopsies cannot be appreciated here, because further particulars as to pain, tumor, etc., are not noted. His statistics, however, go to show the uncertainty of this sign.

Until a systematic examination of the gall-bladder and its contents becomes a part of every autopsy on typhoid fever cases it will be impossible to state how frequently this complication is latent. The rapid development and usually fatal termination make cholecystitis a most serious complication, and therefore the subject of treatment becomes one of immediate importance.

TREATMENT. Of twenty-eight cases the gall-bladder had perforated in twenty-one. These figures show that some form of active treatment is advisable. We have to select from the following: 1. Counter-irritation. 2. Cholecystotomy. 3. Aspiration.

The first is obviously too mild a measure for so serious a condition. If, however, pain only is complained of, active counter-irritation might avert further development.

The real question, however, is between aspiration and laparotomy. Of the three cases in which aspiration was resorted to—those of Pepper (Sr.) and Mason and the present case—Mason's was the only one

to recover. The details of Pepper's case are not sufficient for us to draw any conclusions. From Mason's report it would appear that this was the one measure to have adopted. The patient's condition was apparently too severe for operation, and yet the simple procedure of drawing off three or four ounces of fluid seemed so much preferable that one more than hopes that this would be sufficient. The fact, however, that in our case typhoid bacilli were obtained both by Young and Livingood from the peritoneum would lead one to suspect leakage of the bile, with the undoubted result of a general peritonitis. It is well known that gynecologists have abandoned aspirating ovarian cysts on account of this danger of leakage and general peritonitis. Moreover, in our second puncture we wounded the liver, thus allowing of slight oozing of blood—slight as it was, yet sufficient to produce a thin film of inflammatory exudate on the liver. Considering the rich medium which blood offers for the culture of pathogenic organisms in the abdominal cavity, are we not running a double risk in taking the chances of wounding a viscus? The showings, however, of the results after operation are perhaps as gloomy. Aspiration would seem justifiable only as a means of diagnosis when the purpose is to operate immediately.

The complication occurring at the height of the disease, when the patient is in the worst possible condition for operation, is a serious consideration. If, however, there is any chance of averting what from the table appears to be inevitable, is it not through prompt operation? And are we not increasing the dangers by attempting to aspirate the gall-bladder?

From the foregoing we may then say that acute cholecystitis is a grave complication of typhoid fever, occurring most frequently in the third week, due, in all probability, to an infection of the bile passages, by the typhoid bacillus producing an obstruction to outflow of bile, thus rendering the bile a favorable medium for the growth of the typhoid bacilli, another source of infection being through the hepatic tissues from the blood; the most constant symptoms being pain and tumor in the right hypochondrium. Treatment, prompt operation on development of tumor.

Observer.	No. of cases.	Age	Symptoms.	Day of disease.	Treatment.	Result.	Remarks.
Louis (1836)	...	...	.....	...	.....	.....	Not included in summary.
Ayres (1846)	1	adt	Acute pain in right hypochondrium.	Conval. 21st	.....	Death	Perforation of gall-bladder; no gall-stones.
Budd (1857)	1	18	Pain in region of liver; great tenderness; palpable tumor; no jaundice	21st	.....	Death	Distended gall-bladder; purulent cholecystitis; 14 gall-stones; extensive
Pepper (Elder) 1857	1	...	See list of tapped cases.	...	Tapping	Death	Ulceration Peyer's patches.
Von Hoffman (1869)	1	25	Jaundice.	42d	.....	Death	Perforation of gall-bladder; no gall-stones; typical intestinal lesions.
Burger	1	41	Pain and tumor in region of gall-bladder; chill; no jaundice.	12th	.....	Death	Perforation of gall-bladder; no gall-stones.
Legendre	1	30	.....	14th	.....	Death	Perforation of gall-bladder; three gall-stones.
Murchison	1	yth	Severe abdominal pain.	15th	.....	Death	Perforation of gall-bladder.
Frierichs	1	26	Painful pear-shaped tumor in right hypochondrium; vomiting.	13th	Leeches and counter-irritation	Recovery.	Gall-bladder continued to be palpable late into convalescence.
Lavaran	1	23	Painful tumor in region of gall-bladder.	42d	.....	Recovery.	
Martin-Solon	1	?	General abdominal pain.	?	....	Death	Numerous ulcerat'ns of gall-bladder. (Typhoid fever?)
Husson	1	8	.....	21st	.....	Death	Perforation of gall-bladder.
Dumonlin	1	19	Tumor in right hypochondrim; vomiting; chills.	21st	.....	Death	Gall-bladder contains 2 litres of greenish bile; no gallstones; typical intestinal lesions.
Archambault	1	inf	....	30th	.....	Death	Perforation of gall-bladder; localized peritonitis.
Barthez and Rilliet	1	12	Tumor in right hypochondrium; disappeared before death.	16th	.....	Death	Perforation of gall-bladder; circumscribed pus cavity.
Ranvier	1	28	.....	35th	.....	Death	Perforation of gall-bladder; small stone; localized peritonitis; Peyer's patches cicatrizing.
Colin	1	adt	Jaundice.	21st	.....	Death	Perforation of gall-bladder; no gall-stones (typh. intest. lesions).
Foote	1	32	.....	56th	.....	Death?	Abscess of gall-bladder; small stone.
Williams and Shields	1	31	Peritonitis and perforation.	42d	Operat'n (laparotomy).	Recovery.	Perforating ulcer of gall-bladder; no gallstones.
Stedman (1882)	3	13	Peritonitis.	24th	.....	Death	" " "
		6	.....	20th	.....	Death	1½ pints of yellowish serum.
		16	Tender rounded tumor in region of gall-bladder.	14th	.....	Recovery.	
Griesinger	1	20	Painful tumor to right of umbilicus; disappearance; reappearance of tumor in 8th week, and twice subsequently; no jaundice.	42d 56th	.....	Recovery.	Perforation of gall-bladder; extensive ulceration of inner surface.
Laudet	1	36	Tumor in right hypochondrium, lasting ten days; reappearing at intervals for seven weeks; no jaundice.	28th	.....	Recovery.	

Observer.	No. of cases.	Age	Symptoms.	Day of disease.	Treatment.	Result.	Remarks.
Flexner (1896)	14	...	No hepatic complications detected during life.	...	.....	D.	Typhoid bac. found in 7; no ulceration of gall-bladder (7 out of 14).—*Flexner.*
Chiari 1893–94)	23	12	.....	42d	.....	D.	Purulent cholecystitis; typh. bac. in pus from gall-bladder.
		...	.....	...	.....	D.	No typh. bact. found.
		...	.....	...	.....	D.	Typh. bac. found (19 out of 23).—*Chiari.*
Alexieef (1896)	1	...	Pain in right hypochoudrium; pear-shaped tum. at rt. cost. cart.; 2 days later abd. very tender and dist.; no jaundice; typhoid.	21st	Operation packing and draining.	R. with slight relapse.	Purulent cholecystitis; contents of gall-bladder contained bacteria typhoid.
Curvoisier (1890)	14	...	Typhoidal.	...	.....	D.	10 cholecystitis; 4 perforations of gall-bladder.
Hölscher (1891)	28	...	2000 autop. typhoid fever; 22 jaundice.	...	.....	D.	22 jaundice; 5 purulent cholecystistis; 1 perforation of gall-bladder; balance hepatic degeneration.
Dupré (1891)	2	46	.....	16th	.....	D.	Pure cultures of typhoid bac. from gall-bladder during fever.—*Dupré.*
		45	.....	6 mo. after fever.	Oper. for gall-stones.	D.	Pure cultures of typhoid bac. from gall-bladder 6 months after fever.—*Dupré.*
Chantemesse	1	...	.....	8 mo. after fever.	.....	R.	Not included in summary.
Anderson (1897)	1	67	Intense pain in rt. hypochondrium; swelling at 9th costal cartilage; liver abscess suspected.	3 mo. after fever.	.....	D. 11 dys after onset of pain.	General peritonitis; acute cholecystitis; ulceration and perforation of gall-bladder; doubtful as to whether bac. found in gall-bladder were bac. typhosis or coli com.
Osler, (1897)	3	24	Jaundice, fever, pain in right side; double parotitis; Widal's reaction marked.	1 yr. and 3 mo after fever.	.....	R.	
		29	Frequent attacks of pain in rt. hypochondrium, each attack being more severe, and finally demanding oper.	8 mo. after fever.	Operation.	R.	Purulent cholecystitis.
		37	Pain in epigastrium extending to rt. side; jaundice; no chill; considerable vomiting.	2 mo. after fever.	Operation.	D.	Ruptured gall-bladder; purulent material from gall-bladder contained only bac. coli com. (typhoid fever?).
Dungern (1897)	1	46	Recurring attacks of swelling (and pain?) in region of gall-bladder for fourteen years.	5 yr. after fever.	Operation.	?	Typhoid bac. in fluid from gall-bladder (injected into animals produced typical lesions); no gallstones; 150 c.c. of brownish-yellow pus evacuated from abscess appearing to connect with gall-bladder; pus bile stained.
Cushing, (1897) published (1898)	1	26	No history of typhoid fever. Widal's reaction positive.	...	Operation.	...	Fluid obtained from gall-bladder contained bac. resembling bac. typh., giving all bacteriological reactions of bac. typh. (Malvoz test not tried).
Gilbert and Girode (1890–93)	1	45	Pain and swelling in right hypochondrium.	5 mo. after fever.	Operation.	D.	Purulent cholecystitis; small stone; cultures of bac. typh. in material from gall-bladder.
Francis Hawkins (1897)	1	18	Pain right epigastrium and hypochondrium; jaundice; bile in urine; jaundice persisting three weeks.	...	.....	D.	Purulent cholecystitis; one gallstone; typical typhoid lesion.

CASES IN WHICH TAPPING WAS RESORTED TO.

Observer.	No. of cases.	Age	Symptoms.	Day of disease	Treatment.	Result.	Remarks.
Pepper (Elder), (1857)	1	26	Severe pain and tumor in right hypochondrium.	6 mo. after supposed typh. fever.	Tap'ng, ʒiv withdrawn (for remedial purposes).	D.	4 oz. muco-purulent material withdrawn. *Autopsy:* Distended gall-bladder; 2 qts. semi-purulent fluid; ulceration on inner surface; no stones.
Mason (1896)	1	30	Severe abd. pain, max. intensity in right hypochondrium; tumor in right hypochondrium visible and palpable, 4 cm. in diameter; dull on percussion; descends on full inspiration; condition wholly absent a week before.	21st	Tap'ng, ʒiij̄s withdrawn (for remedial purposes).	R.	Oper considered; patient's condition did not admit of it; tapping resorted to in preference, 3½ oz. fluid withdrawn. *Examination fluid withdrawn:* Pus cells; numerous short, thick bac. w. rounded ends; cultures on potato, milk, sugar, gelatin, and agar showed typical bac. typh. These bacilli agglutinated with serum from cases of known typhoid, also w. pts. serum. Control agglutination tests with serum from p'ts suffering from malaria, pneumonia, phthisis, and rheumatic fever, negative.
Present case (1897)	1	24	Painful rounded tumor in right hypochondrium, not visible; slight yellowing of conjunctiva (colored girl) sudden development. Widal's reaction given, dilution 1–70.	21st	Tap'ng, ʒiv withdrawn (for diagnostic purposes).	D.	*Tapping:* Fluid contains no leucocytes; clear straw-colored fluid; short bac. rounded ends; motile; bacteriol. reaction typical bac. typh. *Operation:* Distended gall-bladder; puncture edge of liver; bleeding surface; thin inflam. layer over punct.; gall-bladder aspirated; several ounces withdrawn; aspirated fluid identical microscopically and bacteriologically to that withdrawn on tapping. *Autopsy:* Typical typhoid spleen and lesions in intestines: inner surface of gall-bladder hemorrhagic—otherwise condition similar to operation note. Bacteriological examination: bac. typh. obtained from gall-bladder and peritoneum (Malvoz reaction given). Three independent observers with similar results.

SUMMARY.

Clinical operation and autopsy reports in	43
Autopsy reports only in	72
Total	115
Bacteriological examination in	40
Contained bacillus typhosus	34

Age.

Infant	1
Between 1–10 years (inclusive)	3
" 11–20 " "	8
" 21–30 " "	11
" 31–40 " "	4
" 41–50 " "	5
" 51–60 " "	0
" 61–70 " "	1
No age given	82
Total	115

Day of Disease.

10th to 30th (inclusive)	19
31st to 50th "	6
51st to 70th "	2
2 to 3 months "	1
4 to 6 " "	1
6 to 9 " "	2
1 year or more	2
No day given	82
Total	115

Symptoms.

Pain only, general	4
" " local (3 of which had jaundice)	4
Tumor only	6
Pain and tumor	11
Jaundice only (22 of Hölscher's cases)	24
No symptoms (infant)	1
" "	8
See table: Flexner	14
See table: Chiari	23
See table: Curvoisier	14
See table: Hölscher	6
Total	115

Pathological Features.

Distended gall-bladder:	
10th to 20th day (inclusive)	1
21st to 30th " "	4
31st to 40th " "	0
41st to 50th " "	1
6 months	1
Perforation of gall-bladder:	
10th to 20th day (inclusive)	5
21st to 30th " "	5
31st to 40th " "	1
41st to 50th " "	2
51st to 60th " "	1
Time not given	5
3 months	1
2 "	1
Stones	4
Purulent cholecystitis only	9
Ulceration	2
Unclassified	72
Total	115

Treatment.

Non-interference:	
Recovery	5
Death	64
Operation:	
Recovery	3
Death	3
Counter-irritation:	
Recovery	1
Death	
Tapping:	
Recovery	1
Death	2
Not included, see table: Chiari	22
Not included, see table: Flexner	14
Total	115

A CLINICAL STUDY OF DUPUYTREN'S CONTRACTION OF THE PALMAR AND DIGITAL FASCIA.

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WHILE the affection known as Dupuytren's finger contraction was not previously entirely unknown, its pathological anatomy and essential nature were first demonstrated by the dissections and operations of G. Dupuytren, from whom it received its eponymous designation. His

original deliverance on the subject was given in a clinical lecture, December 5, 1831.[1] Since that time numerous studies of the disease have been made, an extensive literature produced, and several hundred cases put on record.

The study here presented is based on fifty cases of contracted fascia observed among inmates of the United States Soldiers' Home, Washington, D. C. These cases embrace all grades of severity, from slight thickenings of the fascia in the palms, without limitation of the extensibility of the fingers, to extreme and deforming finger contractions.

A knowledge of the anatomy of the fascia of the normal palm is necessary to an adequate understanding of the pathology and mechanism of Dupuytren's contraction. In the American edition of Gray's *Anatomy* a full description of the normal palmar fascia, from original observations, is given by W. W. Keen, who is one of the principal American authorities and investigators on the subject of the affection under consideration. In brief, the palmar fascia, or aponeurosis, consists of a fan-shaped expansion of firm fibrous tissue radiating from the depression between the thenar and hypothenar eminences (the interthenar depression, it may be called), where it arises from the annular ligament and the tendon of the palmaris longus muscle, over the metacarpus. The palmaris brevis muscle is connected with it on the ulnar side. Opposite the metacarpo-phalangeal articulations there is a well-marked ligamentous band of transverse fibres, the superficial transverse ligament of the palm; at this point many of the longitudinal fibres in the fan-shaped fascia terminate, leaving a few fibres to pass to each of the digits, where they are attached to the skin and fibrous investments of the phalanges. At the web of the fingers is situated another transverse fibrous band, bounding the distal margin of the palm, called the "fibres of Gerdy," or the superficial transverse ligament of the fingers. The fascia is situated immediately underneath the skin of the palm, from which it is separated only by thin masses of fatty tissue; the fascia is intimately connected with the skin by numerous fibrous bands—an important point in the mechanism of Dupuytren's contraction.

Microscopically, the fascia consists of coarse bundles of dense fibrous tissue, which in places are connected with the corium by smaller fibrous bands crossing through the fatty layer which separates the fascia from the cutis. The fibrous fasciculi are arranged longitudinally, and in places transversely also. The fibrous tissue consists mainly of white fibres, numerous among which are exceedingly elongated connective-tissue cells. Penetrating among and running along the fibrous bundles are minute bloodvessels (Fig. 1).

[1] Published in Journal universel et hebdomadaire de médecine et de chirurgie pratiques, Paris, 1831, and elsewhere.

The morbid anatomy and mechanism of the condition known as contraction of the palmar fascia has been settled by a number of post-mortem dissections. It consists essentially of a hypertrophy of limited longitudinal portions or fasciculi of the fascia of the palm and fingers, or a development of new fibres, together with, usually, contraction of the hypertrophied band in a longitudinal direction. The results of this condition are (1) flexions or contractions of the phalanges of the fingers caused by the traction of the shortened bands; and (2) induration and changes in the surface configuration of the skin, caused mostly by traction on the small fibres connecting the fascia with the corium or by the thickened and elevated tissues underneath lifting up the skin.

FIG. 1.

Transverse section of skin and subcutaneous tissues from normal palm, near the metacarpo-phalangeal joint of the ring finger, showing longitudinal and transverse fibrous fasciculi and fibres connecting them with the cutis. Magnified 10 diameters.

Whether the lesion consists of a hypertrophy of pre-existing fibres or is a development of new fibres (a hyperplasia or a neoplasm) has been a point of discussion. The flexor tendons of the fingers, which lie underneath the fascia, are not in the least affected, although the flexion of the fingers strongly suggests a muscular or tendinous pull. Changes in the affected joint have in some cases been reported, due to prolonged malposition and immobilization; involvement of the tendon sheaths has also been reported.

A few microscopical examinations of the lesion have been recorded.

P. Richer[1] found the diseased fascia identical in structure with that of normal palmar fascia, except that the fibrous elements were more compact and more numerous in the contracted band; the aponeurosis alone was altered, there were no evidences of inflammation, and the lesions coincided with those of chronic articular rheumatism.

F. Chevrot[2] reported a thickening of the layer of fascia lying underneath the dermis, so that it formed a dense fibrous or sclerotic tissue not containing any fibroplastic bodies (connective-tissue cells) or elastic fibres; the fatty tissue normally separating the fascia from the corium was absent, so that the dermis merged directly into the hypertrophied fascia; the epidermis was thickened, its superficial cells being less horny, less flattened, and less compacted together than normally, from immobilization and protection of the surface against friction; the dermis was slightly thickened, and the linings of the sweat-glands were apparently thicker than normal.

William Anderson[3] states that the histological appearances are those of fibrous tissue, and that "if the disease is spreading the fibrous strands are intermingled with nuclear proliferation, which extends especially along the course of the vessels." He considers the condition to be an "inflammatory hyperplasia [or neoplastic growth] commencing in the skin and subcutaneous tissue of the palm, involving the fascia secondarily, and replacing the adipose connective tissue." He regards it as due to micro-organisms, but culture-tests and microscopical search gave negative results so far as finding the germ was concerned.

Langhans is quoted[4] as maintaining, as a result of careful microscopical investigation, "that the trouble is due to neoplastic or inflammatory changes, partly in the palmar aponeurosis, partly in the neighboring tissues, including the coats of the arteries and also the capillaries, about which a subendothelial granular adventitia has formed."

I have made a microscopical examination in one case, which was as follows:

Case I.—H. D. J., born in 1828, in Ohio. He was a soldier from 1854 to 1883, and afterward lived on a pension, without working. Aside from nasal catarrh, deafness, and a urethral stricture, his general health was fairly good until the autumn of 1894, when he was attacked with pains in various large and small joints, which gradually became enlarged, together with œdema of the lower extremities. Concurrently with the appearance of this rheumatoid attack a marked contraction of the fascia in the right palm developed, reaching its maximum in the course of about two months.

[1] Bulletin de la Société Anatomique de Paris, 1877, p. 124; and Progrès médicale, Paris, 1877, vol. v. p. 369.

[2] Recherches sur la rétraction de l'aponévrose palmaire, thesis, Paris, 1882, p. 21.

[3] Deformities of the Fingers and Toes, London, 1897.

[4] British Medical Journal, January 10, 1891, p. 62.

When first examined, July 12, 1895, there was marked enlargement of the right knee, the wrists, all the metacarpo-phalangeal joints, and to a less extent of the other phalangeal articulations, causing some arthritic deformity of the fingers; there was also valvular disease of the heart. In the right palm were three bands of contracted fascia from the interthenar space to the little, ring, and middle fingers. The little finger was flexed nearly to the palm and could not be extended beyond a right angle; the ring and middle fingers were similarly contracted, but to a less degree, the middle finger being less affected than the ring finger. The palm, especially on the ulnar side, was nearly doubled on itself, causing a deep, transverse depression which was crossed by the bands of fascia.

There was no further change in the condition of the palm. The patient died of facial erysipelas February 14, 1896.

FIG. 2.

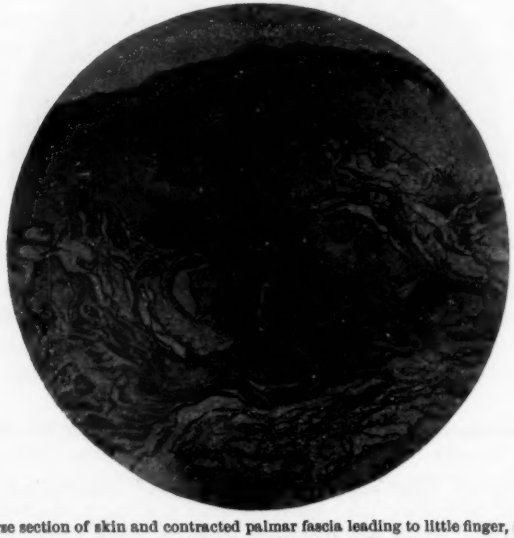
Transverse section of skin and contracted palmar fascia leading to little finger. Magnified 10 diameters.

Microscopical Examination. Transverse and longitudinal sections were made, embracing the contracted band running to the little finger. The skin was thick, but doubtless there is great variation in the thickness of the skin of the palm in different individuals. In most places the fibrous band was in contact with the corium, with no fatty tissue intervening. The epidermis, dermis, and subcutaneous tissue appeared otherwise perfectly normal. The sweat-glands were abundant, but not perceptibly hypertrophied. In the layer of palmar fascia was the contracted band, a large, prominent, longitudinal, rounded bundle of dense fibrous tissue, from 2½ to 3 millimetres in diameter. It consisted of dense, white fibrous fasciculi, among which elongated or linear connective-tissue cells were exceedingly abundant. Some fasciculi, indeed,

were composed mainly of cells, as if the fibrous elements were in process of formation. Through it in numerous places ramified slender arterial and capillary tubes, in the adventitia of or surrounding which was an abundance of connective-tissue cells. As compared with a section of normal fascia, the contracted band exhibited a similar structure except as to its hyperplastic or hypertrophied condition, a greater relative number of connective-tissue cells of normal or ordinary type among the fibrous elements, and a greater abundance or proliferation of similar cells in the adventitia or the vicinity of the bloodvessels. The lesion seemed to consist in a hyperplasia or new growth of connective-tissue cells, which then produced an increased amount of fibrous elements (Fig. 2).

At one point, as shown by a series of sections, the skin was infolded in a longitudinal furrow, from traction by a fibrous band underneath; at the end of this furrow the superficial epithelium dipped downward into the corium, and a tip of epidermis projected entirely underneath the cutis vera (Fig. 3). At one place there was a Pacinian corpuscle directly beneath the contracted band, in the adipose tissue.

FIG. 3.



Transverse section of skin and contracted palmar fascia leading to little finger, showing inversion of epithelium. Magnified 10 diameters.

From these observations the lesion seems to consist in a hypertrophy or a hyperplasia or entirely new growth of fibrous tissue in the palmar fascia, affecting especially circumscribed longitudinal tracts; there is usually a longitudinal contraction of the affected tissue, the thickening being especially manifest in the transverse diameters. In recent or developing cases (like Case I.) connective-tissue cells may be abundant

in the affected tissue; in cases of longer standing (as Chevrot's may have been, though the duration of the disease is not stated) the fibrous elements may be relatively increased and the cells diminished. The skin may be thickened and indurated, and the fascia may come into juxtaposition with the dermis, from disappearance (probably from pressure) of the adipose tissue ordinarily separating the two.

The cases may in general be divided into three groups: (1) The ordinary well-marked typical cases in which there is contraction of one or more fingers, together with the characteristic manifestations of the disease in the palm. The contraction of the fingers varies in degree from marked deformity and disability to only slight limitation of full extension of the finger. This class, therefore, shades gradually into the following group. (2) Cases in which there is hypertrophy of the palmar fascia and the characteristic thickening, induration, and altered configuration of the skin are present in the palm, but in which the fingers are not contracted. These cases in which the lesions are confined to the palm are usually mild, yet they may amount to considerable deformity and some disability. (3) Cases in which the shortening of the fascia and the contraction are limited entirely to a finger, the palm being unaffected. Of the 50 cases observed, 31 were of the first, 18 of the second, and 1 of the third variety.

The conditions present in the affected palms are very characteristic. The contracted fibrous bands occupy certain definite positions. Arising near or in line with the interthenar depression, they cross the concavity of the palm longitudinally, in taut, straight lines, as a bowstring is stretched across the concavity of the bow. The thickened bands, with the overlying skin, form well-marked ridges and elevations across the palm, very apparent to sight and feeling. From the interthena the bands pass in direct and definite lines to the fingers, not taking the direction of the interspaces between the digits. Even when the lesion is confined to the palm the contraction or induration occupies a characteristic and definite locus with relation to the metacarpus of one or another finger, so that the finger which is affected is plainly manifest. In the fingers the band usually follows the middle of the palmar aspect; but sometimes, especially in the little finger, the band crosses the proximal phalanx obliquely, or lies toward one side. Usually the bands in the palm do not branch, and each finger affected has its band distinct from the others; but in three of the cases a band from the interthena to the little finger opposite the metacarpo-phalangeal junction sent off a branch which contracted the third finger also; and in one case there was a similar branch to the middle finger given off from a band leading to the third finger.

Besides the ridges formed by the contracted fascia bands, there are other characteristic alterations of the normal configuration of the sur-

face of the palm. Minute punctate depressions of the skin, frequently pointing wristward as well as inward, are common, caused by the traction of bands connected with the cutis. Nodules, like callosities, formed by indurations of the skin and fascia, are also of frequent occurrence. The metacarpo-phalangeal articulations (especially of the ring finger) are favorite localities for the presence of these indurations and inversions of the skin, though they occur anywhere over the proximal phalanges. The transverse palmar line that runs from the ulnar side of the palm to the web between the forefinger and middle finger is frequently much deepened by the flexion of the fingers. Tension or stretching of the skin is sometimes produced by the traction.

As to the distal termination of the bands, there is some variation. Many small, shortened fibres are connected with and terminate in the cutis, causing characteristic depressions of the skin. In many of the cases in which the lesion is confined to the palm the bands terminate near the metacarpo-phalangeal joints, expending their force on the skin and subcutaneous tissues at those points instead of drawing on the fingers. Occasionally a thick and well-marked band continues some distance up a finger, yet (not being shortened) without causing any flexion of the phalanges. Many bands terminate by a general blending with the skin or subcutaneous fibrous investments of the finger, usually around the proximal phalanx; many others have a more or less definite and distinct insertion, especially into the proximal end of the middle phalanx.

The contraction of the fingers, which is caused by the traction exerted by the shortened bands, consists in a limitation of extension of the finger; within the limits allowed by the contracting band flexion and extension are unimpeded, but beyond them further extension is impossible. The degree of contraction varies from complete flexion of the finger into and against the palm to only slight limitation to the full extensibility of the finger. The contraction may affect any of the three phalanges. When the traction is exerted on the proximal phalanx the finger is flexed as a whole on the metacarpo-phalangeal joint, the extensibility of the middle and distal phalanges being unaffected. When the traction is on the middle phalanx, this is flexed on the proximal phalanx; and if, as commonly occurs, the band is sufficiently shortened, the proximal phalanx is also flexed on the metacarpus, although the band may not be connected with this phalanx. The insertion of the band into the middle phalanx is demonstrable in many of these cases by the fact that when the proximal phalanx is forced into extreme flexion, thus relaxing the band, the middle phalanx can be completely extended, or extended to an increased degree; and when the middle phalanx is forcibly flexed, thus again relaxing the tension, the proximal phalanx becomes capable of greater extension on the metacarpus. In-

sertion of the band into the distal phalanx, with flexion thereof, was observed in only two cases. In one case, in which the first two phalanges were strongly bent, the distal phalanx was hyperextended or bent backward by the contracting band, which crossed along the side of the middle phalanx to the back of the distal phalanx. Fingers adjacent to one strongly contracted are frequently also slightly bent from traction of the skin or fibres (of Gerdy) in the web of the fingers.

In only one case out of the fifty was the digital fascia affected alone, without involvement of the palm. In this case a post-mortem dissection demonstrated definitely the character of the lesion, as follows:

CASE II.—J. B., born in 1820, in Ireland. Soldier, 1851–1867; afterward a laborer, and from 1888 inmate of Soldiers' Home. He was subject to chronic rheumatism, and for some years before death was debilitated and demented, from senility, which prevented the ascertainment of a full history. There was a vague history of some injury to the left little finger about 1880. He died March 2, 1897.

At the time of death his left little finger was contracted. The middle phalanx was flexed on the proximal one to an angle of about 135°; it could not be further extended, but there was no obstacle to flexion. The distal phalanx was slightly flexed on the middle one. The proximal phalanx was unaffected. Along the ulnar side of the palmar surface of the finger was plainly palpable a firm, subcutaneous cord, extending from the base of the proximal phalanx to the last phalanx, apparently the cause of the contraction. Aside from a very faint depression of the skin in the palm there were no evidences of any lesions of the fascia or skin of the left palm.

Dissection. The fascia in the left palm was prominent, but not abnormal. Along the ulnar side of the little finger, just anterior to the plane of the bones, the fibrous tissue was hypertrophied and thickened into a firm, well-marked contracting band. This band lay in the dense fibrous investment underneath the skin and surrounding the tendon-sheaths and phalanges. It arose from the outer side of the base of the proximal phalanx, being connected with fibres from the palmar fascia, with the ligaments and fasciæ about the metacarpo-phalangeal joint, with the common tendinous insertion of the abductor minimi digiti and flexor brevis minimi digiti, and with the fibres of Gerdy, which enveloped the attachments of the band externally. The band passed along the finger in the same relative position, being at all points closely connected with the fibrous investments, and terminated in the antero-external portion of the distal phalanx. The shortness of this band caused the contraction of the phalanges. There was no inversion, depression, induration, or traction of the skin, and no old cicatrices were present.

Such a case as this departs in several characteristics from typical Dupuytren's contraction. It is, however, a distinct contraction of the subcutaneous digital fascia, quite analogous to the much commoner contraction having its seat in the corresponding palmar fascia. The digital fascia is commonly affected in conjunction with the palmar contractions, but rarely (as in this case) alone. The anatomical features

of this case, therefore, seem to ally it with Dupuytren's contraction, and its occurrence demonstrates the reality of fascia contractions limited to the fingers. Hammer finger is the only other affection with which it could be classed. Several instances of what may be termed an acquired form of hammer finger that I have seen were possibly of the same character as this case; but, in the absence of a dissection showing definitely the nature of the lesion, they are not included in the present report.

Of the entire 50 cases the right hand was affected alone in 12 cases; left hand alone, 16 cases; both hands, 22 cases. Or in all. 72 hands were affected, the right hand in 34 instances, the left hand in 38. This indicates a nearly equal liability of both hands to the disease, with a slight difference in favor of the left.

Of the 31 cases in which there was contraction of the fingers as well as thickening and shortening of the fascia in the palm, there was finger contraction in the right hand alone in 10 cases, in the left hand alone in 13 cases, and in both hands in 8 cases—39 hands in all. These figures do not include 7 cases in which, in addition to actual finger contraction in one hand, the other hand had more or less fascia contraction confined to the palm, but without any fingers being bent; including these, the right hand was affected alone in 7 cases, left alone in 9 cases, and both hands in 15 cases.

In the 72 hands affected in the entire 50 cases, 101 fingers were involved in all, as follows: 1 thumb, 20 middle fingers, 50 ring fingers, 30 little fingers. These were distributed as follows with relation to each hand: middle finger alone, 6 hands; ring finger alone, 28 hands; little finger alone, 13 hands; ring and little fingers, 10 hands; middle and ring fingers, 8 hands; middle and little fingers, 2 hands; thumb and little finger, 1 hand; middle, ring, and little fingers, 4 hands. In the 22 cases in which both hands were affected the fingers involved in each were as follows: ring finger of one hand and ring and little fingers of the other, 4 cases; ring finger of one and middle finger of the other hand, 3 cases; middle finger of one and middle and ring of the other hand, both ring fingers, ring finger of one and little finger of the other hand, 2 cases of each; middle finger of one and middle, ring, and little fingers of the other hand, ring finger of one and middle and ring of the other, both little fingers, little finger of one and middle and ring of the other, little finger of one and ring and little of the other, thumb and little finger of one and middle and little fingers of the other hand, middle and ring of one and ring and little of the other, ring and little fingers of each hand, middle, ring, and little fingers of both hands, 1 case each.

Of all the fingers involved, 48 were contracted, in 40 hands of 32 cases (including the digital case), as follows: 1 thumb, 6 middle fingers, 22 ring fingers, 19 little fingers. These were distributed thus: Middle finger alone in 4 hands; ring finger alone, 17; little finger alone, 13; thumb

and little finger, 1; ring and little fingers, 3; middle, ring, and little fingers, 2.

In the 48 contracted fingers the contraction consisted in a flexion of the proximal phalanx in 17, mostly by general traction on the skin or fibrous investments of the fingers; in 26 there was traction on and flexion of the middle phalanx, with or without flexion of the proximal phalanx also; in 2 the distal phalanx was contracted; in 1 (digital case) both the middle and distal phalanges were contracted; and in 2 the condition was indefinite. In one case the distal phalanx was hyperextended.

In 39 of the cases examined with reference to this point no observable abnormal tension or prominence of the tendon of the palmaris longus muscle could be detected in any instance, and this muscle appeared to have nothing whatever to do with the pathology or etiology of the disease. Noble Smith[1] in 45 cases found this tendon tense and prominent in nearly every instance, and to this circumstance he attributed an important share in the causation and pathology of the disease.

In order to determine the frequency with which Dupuytren's contraction occurs, a systematic examination was made of the hands of 1000 men, all ex-soldiers, in age ranging from twenty-one to eighty-five years, and averaging about fifty-three years; 35 of them were colored, of whom none were affected. Of the 1000 men, 40 (or 4 per cent.) had indubitable fascia contraction; in 13 of these cases the palm only was affected, without contraction of fingers, leaving 27 (or nearly 3 per cent. of the whole) having material contraction of the fingers. Noble Smith[2] among 700 elderly inmates of English workhouses found 70 cases (10 per cent.) of Dupuytren's contraction, in 15 of which the affection was confined to the palm. In 444 women examined by him 11 had well-marked finger contractions and 15 others had simply palmar induration; this would leave 256 men among whom occurred 44 cases, or 17 per cent. William Anderson[3] states that of 2600 adults of the poorer classes in certain English infirmaries, about five-sixths of whom were over middle age, 33, or 1.27 per cent., were affected in various degrees, while of 800 children under sixteen none were affected.

The family histories given were in most cases too imperfect to afford any reliable statistics as to the influence of heredity in the etiology of the disease. In 11 of the cases it was stated that the parents had had no finger contractions. In 3 cases a parent was known to have had a finger contraction; in one of these a mother and son each had both hands affected; in one a father and son each had the left hand affected; in one the father had both hands drawn up (possibly by paralytic contractures), the son having both hands affected.

[1] British Medical Journal, February 7, 1885, p. 275.
[2] Loc. cit. [3] Loc. cit.

The occupations pursued at and preceding the time of onset of the disease were stated as follows: farmer, 1; carpenter, 2; porter, 2; soldier, 11; sailor, 1; baker, 1; painter, 1; shoemaker, 2; salesman, 1; bartender, 1; florist (youth), 1; laborer, 7; light labor, 4; clerical occupations, 4; idle (pensioners), 9; unknown, 2. Forty-six were right-handed, two left-handed (with the left hand affected in one, both hands in the other), two not stated.

In 5 of the cases the origin of the lesion was attributed to local irritation incident to the occupation pursued, as holding reins (in this case the affected finger had been bitten by a centipede ten years before, followed by an abscess), lifting, using baker's shovel, playing baseball. In 2 other cases the contraction was thought to have developed after slightly blistering the palm (from using pick, and rubbing liniment on a horse). Two cases were attributed to a strain or wrench of the hands; in one of these the contractions were asserted to have been apparent on the following day. In 2 cases the contractions developed following lacerated wounds of the affected palm and of the tips of the affected fingers. In 3 cases there had been abscesses at the site of the lesions before the contractions appeared. In 1 case (Case II.) the affected finger had once been bruised or injured. This makes 15 cases in which, with greater or less probability, the disease could be associated with more or less recent irritation or traumatism. Besides these, in 2 cases the affected fingers had been injured thirty-five or more years before. In 30 cases there was no history of local irritation or traumatism, recent or remote.

In 42 of the cases there was a history of rheumatism, in at least half of which the rheumatic symptoms were only slight and occasional; the other half had rheumatic attacks of all grades of severity. In only 2 of these cases (Cases I. and III.) were there arthritic lesions affecting the small joints that exhibited any approach to gout. In 8 cases there was no history of rheumatism, nor, indeed, of any general disease at and for years subsequent to the onset of the contraction. In 10 cases rheumatism was marked in the arm, shoulder, wrist, or fingers of the affected side. In 4 of these the development of the fascia contraction was nearly simultaneous with marked or severe rheumatic outbreaks in the affected upper extremity, as follows: In two cases the symptoms consisted in muscular and articular pains; in one (Case I.) the contraction developed concurrently with a subacute rheumatic attack resulting in enlargement of the small joints of the hands; the other case, on account of the accompanying rheumatic and nervous phenomena, is here given:

Case III.—Jos. B., born in 1830, in New York. He was a soldier, 1848–1862, and then a watchman, laborer, etc., until 1892. Since that time he has been a pensioner and inmate of the Soldiers' Home. In

1862 he received a sabre wound over the upper part of the left parietal bone, which disabled him only a few days. He has had heart disease over thirty-four years, and during the past twenty or thirty years has had several severe attacks of rheumatism, being at times laid up for months. His right shoulder was dislocated in March, 1894.

About the middle of January, 1896, he was seized with a severe attack of acute rheumatism, during which various joints were affected and a stiffening of his neck developed. During this attack a marked fascia contraction developed in both hands, the left hand preceding the right two or three weeks. When first examined, March 9, 1896, there was an acute arthritis in the right elbow and both wrists; the neck was stiff and immovable, with the head somewhat turned to the right and flexed on the chest, and the power of rotation, flexion, and extension of the head diminished to small limits; the trapezii were painful and tender. In the right palm a marked band of fascia contracted the little finger to about a right angle; slight bands to the ring and middle fingers were also present. In the left palm a highly elevated band from the interthenar space contracted the little finger to about a right angle; this band also gave off a branch to the ring finger, flexing it to about 135°; slight bands also extended from the interthena to the ring and middle fingers. The nervous symptoms were not fully examined at the time, but a few weeks later anæsthesia was found over the right side of the head and face, and the right upper and lower extremities; the right arm was somewhat paretic and atrophied; the elbow, wrist, and knee jerks on the right side were exaggerated. The cause of these symptoms, whether due to rheumatoid lesions of the cervical vertebræ or nerves, cervical meningitis, or some other obscure nervous disorder, was not definitely determined.

For over a year there was no change in the condition of the fascia contractions; but an examination on March 22, 1898, showed that a marked increase of the contraction the left hand had occurred, the right hand being unchanged. The left middle, ring, and little fingers were stiffly contracted into and against the palm, in positions of extreme flexion.

Seven of the cases, including Case III., gave a history of nervous disease. In one case the affected hand had been the seat of writer's cramp for a year or two before the development of the contraction. In one case the affected hand and side were paralyzed when seen; in one case there had been temporary paralysis of both upper extremities eight years before the contraction appeared; in another there was an attack of hemiplegia thirteen years afterward. One patient became insane several years after the onset of the contraction; one was demented and markedly syphilitic.

One case, in addition to severe chronic rheumatism, had marked glycosuria and polyuria, but without any disabling symptoms of diabetes mellitus. Another also had glycosuria. One had bronchial asthma. Several had cardiac and pulmonary disease, and a number, when observed, were senile. Two had suffered old fractures of the forearm of the affected hand, and one had several years before had a gunshot wound of the wrist of one of the affected hands.

In 45 of the cases the age at which the disease first appeared was determined with tolerable accuracy, as follows: Under twenty years, 1 case; from thirty to thirty-nine years, 7; forty to forty-nine years, 6; fifty to fifty-nine years, 16; sixty to sixty-nine years, 12; seventy to seventy-nine years, 3. These figures indicate that the favorite age of onset is from fifty to seventy years, and that it is rare under thirty years.

The onset and development of the contraction were in most cases insidious and gradual, being manifested only by the slow development of the induration and deformity without any subjective sensations. In only two cases were any symptoms noted preceding the appearance of the contraction; in one a stinging pain was felt in the palm previous to the onset; in the other the appearance of the contraction was preceded by a swelling along the finger and portion of the palm afterward affected, together with stinging pains from the finger-tip to the elbow. The period of development of the contractions, from their first appearance to the maximum attained in each instance, usually varied from a few months to two or three or four years. In a very few cases the contraction was stated to have developed in the course of a few weeks. In some of the bilateral cases the disease reached its full development in a few months in the hand first affected, and then after a quiescent period of perhaps years the other hand began to contract, reaching its maximum in a short period. This, perhaps, indicates a certain amount of intermittency in the active stages of the disease. In two cases of fifteen years' standing and one of five years' duration the patients positively stated that the contraction was still increasing. In one case of five years' standing, under my observation for a year, progress was still evident from comparative measurements; in another case of four years' standing, under observation for three years, intermittent increments of the contracted condition were observed. The other cases when observed were, with one exception, apparently in a stationary condition. The statement is frequently made in descriptions of this disease that the contractions continue to progress indefinitely. My observations, however, indicate that the disease, whether slight or severe, as a rule has a definite period of development, and then remains stationary. It is true that contractions of all degrees of severity, from slight induration in the palm to extreme flexion of the fingers, are met with; but this is not due to contractions being seen in all stages of development, but to the fact that in each instance the disease has, with few exceptions, attained a maximum and is stationary. The actual active period of the disease, the period of development, is comprised within a few months or years.

Subjective symptoms, pain, tenderness, or abnormal sensations connected with and located in the seat of the contraction, were exceptional.

In a few cases tenderness was complained of when the affected projecting surfaces were exposed to the irritation of manual work; and in some instances there were pains in the affected hand or wrist that seemed to be purely rheumatic. Including these two classes, there were thirty-five or thirty-six cases in which no pain had been present properly referable to the disease. In ten or eleven cases there was a history of pain or other subjective sensations apparently distinctly associated with the lesions. Two cases in which the onset of the contraction was preceded by pain have been referred to. In several cases the pain was worse or existed only during the early period of the contraction. In one case pain appeared four or five years after the contraction. In most of the cases in which pain existed at all it occurred at intervals after the full establishment of the contraction, as well as during its period of development. The pain was described in the majority of the cases as an occasional stinging or pricking sensation in the affected region; also as a feeling of numbness or itching; in two or three instances as a dull, aching pain; in one case as occasional sharp, shooting pains. One or two complained of constant tenderness. In one case the abnormal sensation was stated as a feeling of tension in the palm.

In 22 cases both hands were affected. The contraction developed in the right hand first in 5 cases; in the left hand first in 4 cases; in 1 case it was stated that both hands became affected simultaneously. The interval between the development of the contraction in the two hands varied from a few weeks or months to four or five years; in one instance ten years elapsed between the two. In 12 cases it was not known which hand was first affected. So far as could be ascertained, the hand first affected was the one worst affected. The right hand was the worst affected in 11 cases; the left hand in 9 cases; both hands were about equally affected in 1 case. In a number of these cases, however, there was but little difference between the two hands; in others the hands were very unequally involved, one hand showing marked finger contractions while the other exhibited only slight palmar induration. When both hands are involved, therefore, they are usually affected to an unequal degree; further, the lesions are not exactly symmetrical in most cases, but have different locations in the two hands.

The milder degrees of the disease do not cause trouble or discomfort, and only exceptionally are any of the cases attended with pain. The severer forms of the contraction constitute material deformity and disability, the exposed areas in the palm being unduly subjected to pressure and irritation in the use of the hand, the contracted finger being awkward and in the way, and the function of the finger being impaired by its lack of extensibility. In such cases occupations requiring the use of the hand may be interfered with.

The condition once established is permanent unless obviated by sur-

gical measures. In three or four of the cases, it is stated that after the contraction attained its maximum it diminished a little, perhaps by some compensatory relaxation; such improvement is but slight. In one case a bent ring finger was caught in a large dog's collar and given a severe pull, which ruptured the contracted fascia and lacerated the skin in the palm, and thus released the finger; the wounds healed without recontraction, so that the disability was nearly removed by this accidental forcible divulsion.

The diagnosis of the condition from other affections of the hand is usually unattended with difficulty. The bent finger, the ridge in the palm corresponding to the contracted band, the rounded, callus-like indurations, the small wristward inversions of the skin, and the definite location of the lesions are characteristic features which even in mild cases distinguish this affection. Even faint stigmata of the disease are quite distinguishable. Finger contractions resulting from paralytic conditions are readily recognized. Contractions from tendon lesions do not exhibit the characteristic surface changes of fascia contraction. In cicatricial contractions there is the history of injury and absence of the typical features of Dupuytren's disease; in a few of the cases here considered there were antecedent wounds and cicatrices, but the pictures presented were of unquestionable fascia contractions. Deformities caused by the various affections of the joints are recognizable by the history, anatomical conditions presented, or accompanying constitutional condition; these conditions and Dupuytren's disease may coexist, however, introducing an element of doubt as to the precise share either may have in the production of the deformity present. Hands are frequently seen in old men and hard manual workers in which the fingers are generally and equally slightly contracted, while the skin of the palm is hard and shrunken; this is probably due to a general induration and slight contraction of the skin and subcutaneous tissue, and is quite different from the localized hypertrophy of Dupuytren's disease.

The diagnosis of contractions limited to the digital fascia is more difficult, as in the absence of skin changes the deformity may be very similar to contractions due to arthritic or other causes. The reality of such digital cases is demonstrated by the dissection above described. There is a class of cases, comprehended under the designation "hammer finger," the differentiation of which from contractions of the digital fascia in many cases might prove difficult. Hammer finger consists in a flexion of, usually, the middle phalanx of the little finger on the proximal phalanx; it is usually described as a congenital or developmental affection, and is said to be due to abnormal shortness of the lateral ligaments of the affected joint. I have seen several cases otherwise exhibiting all the external clinical features of hammer finger which developed in adult life—that is, were acquired rather than con-

genital. It is possible that some of these cases of acquired hammer finger may be due to contraction of the digital fascia; but, as in the cases observed I was unable to demonstrate that fact beyond doubt, I have excluded them from this collection of cases. Two of the cases of fascia contraction here considered exhibited what I regarded as hammer finger, in addition to Dupuytren contractions; the two fingers thus affected are not included in the statistics. It is quite possible that some cases diagnosticated and recorded as Dupuytren's contraction, especially the alleged congenital cases, are in reality examples of hammer finger.

The etiology and pathology of Dupuytren's contraction have never been satisfactorily determined, and very diverse theories of its causation have been held. One theory, held among others by Dupuytren, is that the disease is caused by slight local traumatisms or by continuous use and irritation of the palm incident to manual labor. In the cases here considered the lesion was attributed with more or less probability to local causes in scarcely one-third of all the cases. Some of those affected were engaged in manual occupations, but a considerable proportion were not, and some were entirely idle. The nature of the occupation habitually pursued is not, however, always a safe criterion as to the occurrence of palmar irritation, since the hand inured to labor is hardened and toughened, tolerant to the extra usage to which it is exposed, and more immune to local irritation; while the softer hand of the person not engaged in hard manual work is easily blistered or irritated on the occasions, almost inevitable even with idle persons, when any unaccustomed use or unusual strain is put upon the hand. Thus, in the case of a clerk an abscess developed from irritation caused by the use of gardening tools during leisure moments; subsequent to this a fascia contraction appeared. Another man, who was idle, attributed the contraction to a strain of his hands incurred in turning a tight faucet. In scarcely any of the cases in which the lesion was attributed to local causes was the history sufficiently distinct and the connection sufficiently authentic to warrant positive conclusions as to the existence of any relation between the two. It is possible that local injuries or irritation might occur too slight to be remembered, yet sufficient to excite fascia contraction; this consideration, however, cannot validate any assumption that in all cases a forgotten traumatism must have occurred, especially as in the majority of cases there is a complete absence of such history. On the whole, so far as the histories go, the facts observed in this series of cases are decidedly adverse to the supposition that the disease is essentially due to local traumatic causes.

There are other considerations opposed to the theory of the traumatic origin and in favor of the contrary view of the idiopathic origin of the disease. The favorite age of onset is after middle life, years after the

period of active labor begins; still, this consideration is qualified by the fact that the senile period is more subject to cirrhotic changes than the earlier periods of life. The left hand is as frequently affected as the more-used right, and the ring and little fingers much more frequently than the radial half of the hand, which bears the brunt of labor equally if not to a greater degree. If due to traumatism there would seem to be no reason why the disease should not be commoner than it is. The marked influence of heredity observed in this affection, the limitation of the disease to distinct longitudinal tracts, the secondary development of contractions in the other hand after one has become affected, are unexplainable on the local traumatic theory. There is little doubt that Dupuytren's contraction is essentially of idiopathic origin, and that local traumatisms, such as occupation-use, irritation, wounds, or abscesses, have no more than, perhaps, some occasional influence in lighting up the disease.

A germ theory of the causation of the disease is not wanting. Anderson[1] believes "strongly that the active cause of the disease is a chronic inflammation probably set up by a micro-organism, which gains access to the subcutaneous tissue through accidental lesions of the epidermis." This theory does not seem probable in view of the protracted and benign course of the disease and the absence of inflammatory phenomena; and especially as it throws no light on the bilateral occurrence of the lesions or the influence of heredity.

The theory that the disease is a manifestation of some constitutional condition, such as gout, rheumatism, and the like, has been widely held. The cases observed are rather suggestive as to some relationship of the disease with rheumatic or rheumatoid disorders. In 42 cases (84 per cent.) there was a rheumatic history, in about 20 of which rheumatic attacks had been more or less severe. This would seem to be a significant proportion; this consideration, however, loses much of its significance in view of the fact that the class of men from which these cases came were very prone to rheumatic trouble, and any like number of them of corresponding ages unaffected with Dupuytren's contraction, selected at random, would probably present about the same proportion of rheumatic cases. The occurrence of 8 cases entirely without history of rheumatism or any allied condition shows that the latter diseases cannot be the sole essential cause of the fascia contraction. The few cases in which the development of the contraction was associated with an arthritic outbreak (like Cases I. and III.) may have been coincidences, or the histories may not have been correctly stated; or it may be true that occasionally rheumatic disorders, especially if local, may have some contributing or exciting influence upon the lesion in question. My

[1] Loc. cit.

observations do not lead me to the belief that the condition is a manifestation of, or is essentially and specifically caused by, rheumatic or rheumatoid disease.

That true gout is its specific cause can hardly be successfully maintained. The disease occurs in America, where typical gout is uncommon, and among social classes not subject to gout. In only a very small proportion of the cases observed by me was there any personal or family history that could be construed as gouty. In many of the cases cited in support of the gouty theory the evidences of gout are vague and remote, and there is little to indicate that the coexistence of the two conditions is more than coincidental; and the argument that when no other gouty manifestation is present the contraction is itself the symptom which shows the existence of gout is an instance of circular reasoning. C. B. Lockwood[1] has reported a dissection in which the joints generally were infiltrated with urate of sodium and had undergone extensive pathological changes; there was a fascial contraction of one finger, and the band was abundantly impregnated with crystals of sodium urate, which was continuous with the deposits surrounding the flexed phalangeal joint. Here there was a distinct association with a gouty condition, but whether the relation was causative does not appear; the case, however, is exceptional.

That Dupuytren's contraction is a manifestation of any other constitutional condition, such as diabetes or syphilis, I see no reason to believe.

The possibility of the nervous origin of the disease is worthy of consideration. The marked predilection of the disease for the ulnar side of the hand shows to some degree a relation with the distribution of the ulnar nerve. The pricking or tingling sensation specified in most of the few cases complaining of pain is quite suggestive of the paræsthesia of a nervous lesion. The involvement of both hands, one being affected subsequently to and to a less degree than the other, may point to the operation of sympathetic (nervous) action in reproducing the disease on the side opposite to that first affected. Some very suggestive cases are on record in which Dupuytren's contraction was associated with nervous disease producing trophic lesions, as syringomyelia, anterior poliomyelitis; Case III. is similarly suggestive. In a case reported by Lange,[2] a woman who had a contraction of both ring fingers had an attack of left hemiplegia, almost immediately after which the contraction in the left hand disappeared, the right palm remaining unchanged. G. C. Kingsbury[3] has reported a case of fascia contraction in both hands, apparently associated with some form of occupation neurosis, in which the contractions, pain, and cramps entirely disappeared after two hyp-

[1] Transactions of the Pathological Society of London, 1885-1886, vol. xxxvii. p. 557.
[2] Cited in Buck's Reference Hand-book of the Medical Sciences, vol. iii. p. 499.
[3] British Medical Journal, January 10, 1891, p. 62.

notic séances. These two curious cases may have some significance as to the trophic origin of the disease. Of the entire fifty cases observed by me, however, only seven gave a history of known nervous disorders; it is, of course, possible that obscure trophic influences might exist adequate to cause this disease, but without other manifestations. While a neuropathic or trophic theory of the pathology of Dupuytren's disease would be attractive and is supported by some considerations, it cannot as yet be regarded as having sufficient basis for final acceptance.

Robert Abbe has presented a detailed neuropathic theory of this disease.[1] He considers the original cause to be a slight traumatism of the palm, often forgotten; this peripheral irritation produces a central spinal impression which then sends a reflex influence to the part originally hurt and incites a contraction of the fascia. This contraction sets up a second series of reflex symptoms, and by sympathetic action causes a reproduction of the trouble in the corresponding part of the opposite hand. He lays stress upon the irritation of the original traumatism or the tense contractions being an exciting cause of neuralgias, local and distant, joint inflammations, and other symptoms simulating rheumatism and gout, and various general symptoms and neuroses, and cites cases in which these disorders were relieved by operation on the contracted fascia. In very few of the cases observed by me were there any such symptoms that could in any way be attributed to the contractions. On the contrary, in most cases the lesion was the seat of little or no irritation and seemed perfectly benign and innocuous.

Dupuytren's contraction is one of the scleroses, a hypertrophy or hyperplasia of connective-tissue elements; it might well be termed palmar sclerosis. Among the principal affections of this class are the visceral cirrhoses, as of the liver, kidney, and lungs, arteriosclerosis, and the various spinal scleroses. They are all diseases to which the late adult or senile period of life is especially subject, as is also contraction of the palmar fascia, the anatomical characters of which ally it with them. The spinal scleroses, locomotor ataxia, antero-lateral sclerosis, multiple sclerosis, etc., offer some points of analogy with palmar sclerosis in their obscure causation and the specific limitation of the lesions to definite longitudinal tracts. Interstitial pneumonia is secondary to other forms of pulmonary disease. Cirrhoses of the liver and kidney are chiefly due to prolonged irritation of toxic substances circulating in the blood. Arteriosclerosis is due to similar causes, also to the irritative effects of habitual overdistention and to hereditary influences. Interstitial disease of the heart substance is associated with arterial sclerosis. These disorders show a marked association with toxæmic and other irritation, and this relationship suggests a similar

[1] Medical Record, New York, March 3, 1888, p. 236.

causation for Dupuytren's disease. This recalls the theory of the connection of this disease with gout, or lithiasis, which is one of the forms of toxæmia. Why the palm, rather than other regions, should suffer in this manner from irritants circulating in the blood, and especially why the hypertrophy should be limited to specific longitudinal fasciculi in the palm, does not appear. One would expect more general consequences from either local or toxic irritation. Dupuytren's contraction differs from the visceral scleroses in being sharply localized, while the latter are diffuse and general. Toxæmia does not appear to be a very probable cause of palmar sclerosis.

Contractions of the plantar fascia have been reported, analogous to those of the palm; cases of induration or contraction of the penis, associated with Dupuytren's disease, are also recorded. Keloid, fibromata, and cicatrices are allied in some respects to palmar sclerosis. The contraction of ligamentous structures in talipes and in joint lesions, and of cicatrices, also presents some analogies, especially with respect to longitudinal shortening.

The only conclusion as to etiology that seems warranted is that Dupuytren's contraction is of idiopathic origin, most apt to occur in the senile period, and showing marked hereditary influence. There is no one known constitutional disease with which it is exclusively associated or of which alone it is a manifestation. It does not appear to be specifically caused by local irritation or traumatism, though this factor, as well as local or constitutional pathological conditions, may at times have some exciting or contributing influence. Perhaps it is a neuropathic or trophic condition.

EMPYEMA OF THE FRONTAL SINUSES AND INTRACRANIAL INFECTION.

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The writer has been able to find but very meagre details concerning the severer forms of suppuration in the cavity of the frontal sinuses. Even the special works devoted to such subjects make scarcely any reference to the possible extension of this form of infection to the interior of the skull. Assuming, therefore, that these severe conditions are comparatively rare, the writer has ventured to report at some length a case of this nature which presents uncommon and almost unique features.

Case I.—J. C., male, aged thirty-two years, entered St. Luke's Hospital February 20, 1897. There is nothing in his antecedent history which has a bearing on his present trouble. In September, 1895, a swell-

ing was noticed at the inner angle of the left orbit; five days after its appearance it was lanced and pus evacuated. A sinus persisted, and a year later the left frontal sinus was trephined at another institution and the cavity drained externally. No attempt was made to establish drainage through the nose. This operation brought no relief; the sinus still persists and discharges a small amount of pus all the time. At various times in the last two years he has had polypi removed from his nose. He thinks his original manifestations of trouble with his nose and frontal sinus date back some three years. He now seeks relief from the annoyance of the discharging sinus, and for persistent frontal headache, most marked of late on the *right* side. Has lost about fifteen pounds.

Interior of the base of the skull, showing bony defect between the cranial cavity and the right frontal sinus.

Physical examination reveals nothing of note except the local condition. At the inner extremity of the left eyebrow is a narrow sinus discharging pus. It readily admits a silver probe, which passes directly back one and three-quarter inches before it meets any resistance. No bare bone is felt, but no energetic manipulations are undertaken. Percussion of the forehead elicits a vague and unlocalized pain. Both nostrils are obstructed by polypi.

Operation, February 27th. The left eyebrow is shaved and the surrounding skin disinfected. Ether anæsthesia. Horizontal incision in line of eyebrow including the sinus at its central portion. Fistulous

opening freely enlarged with gouge, evacuating a considerable amount of pus. Cavity freely scraped with a Volkmann spoon, except for the posterior wall, where there was danger of perforating the softened bone. In applying the spoon to the septum it easily penetrates into the *right* frontal sinus and lets out about two drachms of pus, which appears to be under considerable tension. (There is no pulsation, however.) Cavity irrigated with saline solution; no fluid escapes through the nose. An attempt to pass a probe through the infundibulum on the left side from above downward fails, but succeeds quite readily when the probe is passed upward through the nose. It is believed that, as the two sinuses have been practically converted into one and there is double drainage, externally and below, a further external opening over the right sinus can be omitted, unless time should prove its necessity. A piece of rubber drainage tube is passed downward through the nose in accordance with the valuable advice of Dr. D. Bryson Delavan. The tube is brought out through the external opening and through the nose. It is intended to keep the canal open, but not *per se* to effect drainage. On irrigating through the external opening the tube is made taut, thereby diminishing its calibre and allowing the fluid to run down alongside of it.

Recovered well from the anæsthetic. The following day complained of soreness in the back of the head. Two days after operation there developed stiffness of the neck, twitching of the facial muscles—in short, a typical meningitis. After three days there was a remarkable temporary remission of symptoms, mind became clear, and he sat up in bed and wrote letters. He soon relapsed, and died nine days after operation, with all the evidences of a septic meningitis.

During life the cavity of the frontal sinuses had been washed out through the external opening several times in the course of the day. It was soon noted that this procedure was followed by a marked aggravation of symptoms, and it was realized that a direct communication with the interior of the cranium must exist.

Autopsy by Dr. Van Horne Norrie. Brain: Intense congestion of pia. Moderate amount of pus in the pia at the base of the brain, especially over the pons and the cerebellum. Slight flattening of the under surface of the frontal lobe on the left side. The cerebral wall of the right frontal sinus is entirely wanting, there being a loss of substance at that point one inch in diameter. The opening is in the form of a nearly perfect circle; its edges are smooth and well defined. The anterior wall is continuous with the inner surface of the skull. A slight edge of bone separates the cavity of the frontal sinus internally from the cranial cavity. Above and posteriorly it is closed in by thickened dura. The outer surface of the dura at this point is very much thickened, covered with granulation tissue and blood. The cribriform plate is carious, especially on the right side. An angular mass of bone (cerebral wall) projects about three-quarters of an inch above the site of the *left* frontal sinus, pressing laterally against the crista galli. Upper surface of this bony mass presents two openings, one small, the other half a centimetre posterior to the first and communicating with the frontal sinus.

Diagnosis. Empyema of the frontal sinuses, caries of frontal bone, purulent meningitis.

The condition of the cerebral wall of the left frontal sinus, as found at the autopsy, had been recognized during life as a probability, and was not surprising as a result of a long-standing suppuration of the mucous membrane, extending to and perforating the bony partition. It may be mentioned here, however, that intracranial infection may complicate an ordinary sinus empyema without the existence of any recognizable bony perforation.

As will be seen by referring to the account of the operation, the failure to make a second external opening over the right frontal sinus rendered thorough exploration of the cerebral wall and the recognition of its condition impossible. Therefore, the result of the autopsy, showing the entire absence of this bony partition and the resulting wide communication between the cavities of the sinus and the skull, was naturally surprising. Such a condition is almost unheard of, and could scarcely have been foreseen, as at the most one would expect simply to find such evidences of erosion as were found on the other side.

One naturally seeks to find a suitable explanation for so marked and unusual conditions. Etiologically a number of factors might, on theoretical grounds, be offered as responsible for this bony defect. Practically we are reduced to the following:

1. Destruction of the bony wall by extension of a suppurative process originating in the frontal sinus—empyema.

2. Destructive inflammation originating in the inner table of the frontal bone.

3. Structural deficiency of the inner table at the usual site of the cerebral wall of the frontal sinus.

What the writer is now inclined to believe to be the probable condition was not present in his mind when the anatomical conditions present were revealed by the autopsy. The natural explanation then seemed to be that the long-standing suppurative process in the right frontal sinus, never having received any outward vent, had attacked and completely destroyed the thin posterior wall. This view seemed eminently reasonable, as the other side showed unmistakable, though much less extensive, evidences of such a process in the eroded areas of its cerebral wall. That the process here had not attained such a degree of severity might be attributed to the more or less free drainage during the past year and a half. When, on further reflection, the extent and symmetry, the well-defined and perfectly smooth edges of the bony defect were considered, it seemed difficult to reconcile these appearances with the probable action of a suppurative process acting by erosion. In the latter condition we ought to expect evidences of such destruction—softened, carious, irregular edges, etc.—while, on the contrary, we had to deal with appearances which might be compared to those of a casting from a mould. In seeking, then, for another explanation, the writer's

attention was naturally directed toward the possibilities of the second group (2), it being believed that a process originating in the bone would be more likely to result in a loss of substance of better defined limits than in destruction by erosion or extension of a contiguous process.

While the explanation last mentioned had its attractions, it was realized that its probabilities were not very strong. The only process to be seriously considered was an osteomyelitis—a rare condition, especially if the term is rightly applied to describe a disease originating in the bone.

Out of the scanty literature the author has found scarcely any truly illustrative cases of this condition. The following case may be quoted to show that it does exist.[1]

CASE II.—Male, aged sixteen years. When first seen had been ill six weeks and an abscess had opened spontaneously at two places on the forehead. Probe passed five to six centimetres directly into an abscess of the left frontal lobe. A free opening was made. On the posterior aspect the dura mater was seen covered with fungous granulations. It was opened by a crucial incision, disclosing an abscess of the frontal lobe. Following the operation there was an amelioration of symptoms; but a cerebral hernia subsequently developed, necessitating further operation. After having nearly obtained a cure, another focus made its appearance at a remote point, perforated the parietal bone, and infected the meninges, with a fatal result.

The reporter seems to have no doubt that here the process originated as an osteomyelitis, as it took less than three weeks to develop cerebral symptoms, the patient previously having been in perfect health.

The following cases are cited by Albert and Kolisko[2] as examples of osteomyelitis of this portion of the frontal bone:

CASE III.—Man, aged twenty-six years. Symptoms dating back about five months. Left frontal sinus opened with chisel and hammer. The outflowing pus shows distinct pulsation. Good recovery; during convalescence pulsation accompanied discharge of pus.

Commenting on the history of the case, the authors remark:

"It may be objected that the patient simply had an empyema of the frontal sinus, as in the months of November and December (at the onset of the disease) there was a purulent discharge from the nose; this could be only a symptom of retention. The evident pulsation, synchronous with the heart's action, exhibited by the escaping fluid at the time of operation and subsequently, shows positively that the purulent focus was in direct communication posteriorly with the interior of the skull. Secondly, there was a bulging of the bone (forward?). Thirdly, the situation of the tumefaction was such that it can at all events be granted that there was probably a temporary suppuration into the adjoining frontal sinus, just as the knee-joint becomes involved when

[1] Ricardo Botey. "Traitement des sinusites frontales chroniques et des lésions intra-crani-ennes consecutives." Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie, January 16, 1897.

[2] Beiträge zur Kenntniss der Osteomyelitis. Vienna, 1896.

there is an osteomyelitis of the lower end of the femur; the roof of the frontal sinus was, however, the seat of an abscess."

It will be noted that the foregoing history and comments give no proof of the recognition, either by sight or by touch, of a destructive bony process, no evidence of its location or size, whether multiple or single. Except for the statement of the authors' belief to the contrary, nothing is adduced to show that this was not an ordinary empyema with extension of the process to the bony wall. There is also nothing in this case to show that there was not a condition exactly similar to that which was found to be present in the case under consideration.

In the following example the same authors are perfectly certain of their ground:[1]

CASE IV.—Man, aged twenty years. Symptoms of two months' duration. Incision over prominent swelling in right superciliary region. Pus was evacuated, when pulsation at once became apparent. The purulent focus here was at a point "remote from the frontal sinus." Two years later patient reported that on numerous occasions bony particles had come away.

To the writer's thinking, neither of these cases should be accepted as instances of osteomyelitis of the cerebral wall of the frontal sinus.

It may be that in the case which is the subject of this paper the disease began as an osteomyelitis, but there is little evidence in favor of such a view, except that the onset was apparently quite acute. As between osteomyelitis and ordinary empyema, the chances are in favor of the latter, as there was an etiological factor, chronic nasal irritation, and the whole history of the case was not incompatible with that of a possible frontal sinus empyema. The exquisite anatomical conditions found on the right side do not, in the writer's opinion, justify the belief that the bony defect was necessarily the result of an inflammatory process *per se*. It is readily conceded that the disease was originally a simple empyema of the antrum, but the bony defect is held to have been a probable intercurrent factor and not a sequence of the original disease.

If, therefore, we eliminate as exciting causes an ordinary empyema with secondary destruction of the inner table, and a primary osseous suppuration, the theory of a structural malformation alone remains to be considered. (We cannot classify this structural malformation as a congenital defect, as the frontal sinuses do not make their appearance until a variable period in early childhood. Their existence is due to the absorption of bone between the inner and outer tables of the skull at that point.)

The existence of such a defect as is described in this paper must be

[1] "Keinen Zweifel liess ein anderer Fall zu."

a very rare condition. The writer had been unable to find any mention of such a condition, when he became greatly indebted to the courtesy of Dr. Thomas Dwight, Professor of Anatomy in the Harvard Medical School, for furnishing him with a reference to a case described by Zuckerkandl.[1]

The appearances found are described as follows: Upon separation of the dura there was seen in the orbital roof (left side) a bony opening about the size of a lentil, the edges being sharp and exceptionally thin. On its under surface it was shut off by the lining membrane of the frontal sinus. The important point is that in such a case the soft parts within the frontal sinus are in contact with the dura mater.

It will be noted that the above represents a condition simply of bony deficiency, not of a disease. The appearances of the parts as described above correspond quite closely to those described in this paper, except that the latter are more extensive and are complicated with the element of suppuration. History repeats itself, and, although such an appearance, with the exception of Zuckerkandl's case, would seem to be unique, there are probably similar conditions either unknown to the writer or as yet unrecorded. If a defect on the cerebral wall is a rare occurrence, it is much less so with regard to the outer table, where defects of the floor leading into the orbit have been noted with comparative frequency; and it seems reasonable to believe that the causes responsible for the latter condition may occasionally affect the cerebral wall also. That a defect exists may be attributed to the unevenness or excess of the bony absorption to which the frontal sinus owes its existence. For the larger varieties of sinuses probably more than an absorption is necessary: there must be a bulging or expansion of their walls. If a small, bony lacuna exists at a central point before a marked expansion takes place, a considerable increase in size of the original hole must result.

The writer believes, therefore, that, in view of the various facts that have been brought out, a statement of the features of his case would be correctly expressed by the following:

First, nasal trouble, starting up a left frontal sinusitis; with persistence of the trouble, beginning caries of the cerebral wall on that side. At a probably much later period infection of the *right* frontal sinus, either from the left side, but more probably from the nose, or from both. On this side the cerebral wall was the site of a structural defect, so that there was no bony partition between the cavities of the sinus and the skull, and infection of the cerebral covering necessarily resulted.

While the object of this paper seeks to call attention to a rather uncommon phase in the pathological anatomy of the frontal sinuses, and not to consider the general principles of treatment of empyema of

[1] Normale und pathologische Anatomie der Nasenhöhle, Band i. p. 333. Second edition, 1893.

these sinuses, it may not be out of place to attempt to draw some conclusions from the lesson taught by the facts brought out by the clinical history and the post-mortem findings. In reviewing the latter it would seem that under possibly similar conditions certain variations from the course pursued might be made to advantage.

The autopsy showed that the writer was justified in having relied on a single external opening over one of the sinuses, supplemented by nasal drainage, properly to remove the secretions, as both sinuses were found to be completely free of pus. This failure, however, to make an opening so situated that every part of the sinus could be explored the writer now believes to have been a distinct mistake. Certainly one external opening, unless situated in the median line and of a sufficient extent, fails to give proper facilities for exploration, and this step, in the light of the experience quoted, is absolutely necessary for carrying out an efficient line of treatment.

Tilley[1] recommends a median incision even when only one sinus is affected. He makes an incision from about the root of the nose below, continued upward in the median line for one and a half to two inches, then, having raised the periosteum from the bone over the position of the sinus, the former, with the other soft parts, is drawn to one side, thus fully exposing the bone, which may be removed by gouge and mallet or trephine. The latter is applied to the nasal portion of the frontal bone, between the vertical median line and a line drawn vertically upward from the internal angular process, it will in all cases open the sinus on that side, if one exists. If it was found that the sinus was a very large one, and that it was necessary to make an incision at a right angle to the vertical one, passing outward in the line of the eyebrow. A very manifest advantage of the median vertical incision is that the scar is in the median line, and, being in the direction of natural skin, cleavage is scarcely noticeable a few weeks after operation. By locating the exterior opening as near as possible to the nose it seems to facilitate access to the infundibulum.

If, on examination, the bone is found to be eroded or perforated, it should be carefully scraped or gnawed away to the extent found necessary. If an extradural abscess is found it should be explored and any pockets broken up and outlying recesses drained. Whether the dura is to be opened for the purpose of exploration must remain an open question, to be judged by the appearance of the process, the intensity and duration of the symptoms. Should the underlying cerebral substance present any apparent changes from its normal consistency, opening of the dura or puncture with the exploring needle, or both, will probably be in order; and if intracerebral suppuration is discovered it must be

[1] Lancet, 1896, ii. p. 866.

treated on general principles. In case such radical procedures are indicated, the osseous openings, internal and external, will necessarily have to be made as large as possible. The possibility of a complicating cerebral hernia should be borne in mind, and forestalled, if possible, by suitable packing.

Irrigation, unless the absence of bony perforation is absolutely demonstrated, should never be employed after the experience gained by the consideration of this case, in which it was apparently the direct cause of death, setting up an increased tension in the old focus, with rapid spread of the infectious agents. It would seem likewise unwise, if a communication with the interior of the skull has been found, to establish a communication downward into the nose; for, on theoretical ground, certainly a communication between the two cavities should be rigidly avoided. Should the patient eventually recover, and the channel into the skull become firmly obliterated, drainage downward might be instituted at a later period if the external sinus failed to close. Likewise, after long continuance of a fistulous tract, its excision and closure by a plastic operation might be possible after establishing nasal drainage. (Botey.)

46 West Thirty-third Street.

THE RELATION OF THE TRACHEA AND BRONCHI TO THE THORACIC WALLS, AS DETERMINED BY THE RÖNTGEN RAYS.[1]

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The relations of the trachea and the bronchi to the chest-wall, although of value to the diagnostician and the therapeutist, have been practically hypothetical, chiefly on account of the inherent difficulties in demonstrating them.

These difficulties have been largely overcome by skiagraphy, which enables us, as it were, to look through the more transparent tissues of the thorax, and, while retaining the bony landmarks in the view, see the bronchial tree accurately outlined against them. In order to render this possible the bronchial tree has to be made impervious to the rays, which is easily done by the injection of a proper substance.

Certain precautions, however, have to be taken. The opaque substance must not fill the smaller air-passages, for if it does the course of

[1] Read before the tenth annual meeting of the Association of American Anatomists, held at Ithaca, December, 1897.

the larger bronchi will be obscured. To prevent distortion or sagging from the weight of the injection mass the whole body should be hardened. The mass should be as impervious as possible to the rays.

In preparing the subjects from which the accompanying skiagraphs were taken, the following method was employed.

The bodies were first hardened by injecting the arteries with a solution of formalin, and then the bronchi were filled with a metallic alloy fusing at 155° F., forced in at a very moderate pressure. The skiagraphs were taken by Dr. Edward Leaming with the apparatus belonging to the College of Physicians and Surgeons.

In exposing the bodies to the rays they were placed as far as possible from the tube in order to obviate error in the projection of the shadow. The formalized bodies were found to offer considerable resistance to the passage of the rays, and thus several plates were spoiled by underexposure. The plate was placed four feet from the tube when the children were skiagraphed. When skiagraphing the adult it was found impossible with a reasonable length of exposure to obtain a skiagraph when the plate was placed at a distance greater than two feet. The exposure varied from one to five hours.

When the plate is placed behind the subject and the rays are passed through from before backward, the bones of the dorsal thoracic wall only appear on the plate, and in order to obtain radiographs of the sternum it was found necessary to pass the rays in the opposite direction after the removal of the dorsal thoracic wall.

In order better to understand the relations of the bronchial tree, it is well to review the course and distribution of the bronchi in the lungs.

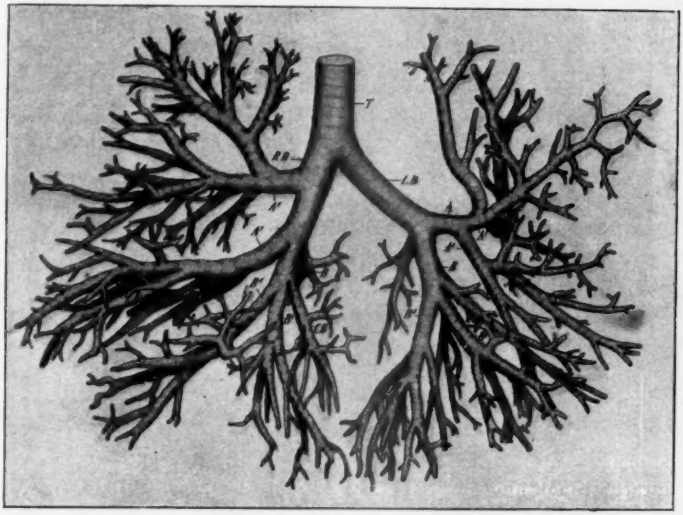
Our knowledge upon this subject was exceedingly vague and indefinite until Aeby's[1] work was published in 1880. By making casts he was able to get a very fair idea of the ramifications of the tree. The descriptions of the bronchial tree in our anatomies have been based upon his conclusions, which may be briefly stated as follows: That the type of division of the bronchi is a monopodic and not a dichotomous one, namely, the main bronchus may be traced as a stem bronchus for some distance, and that it gives off four ventral and dorsal branches. Of these the ventral branches are the larger, as the stem bronchus is situated nearer the dorsal than the ventral aspect of the lung.

On the right side, however, beside the small cardiac or azygos bronchus, there is an additional ventral branch which passes above the right pulmonary artery and supplies the upper lobe of the right lung. This bronchus, from its relation to the artery, is known as the eparterial bronchus, and, according to Aeby and others, is not represented upon the left side. The remaining branches on both sides are known as hyparte-

[1] C. Aeby. Der Bronchialbaum der Säugethiere und des Menschen.

rial. It is extremely difficult to recognize Aeby's conception of a stem bronchus if a large number of corrosions of the bronchial tree are examined. If reference be had to Fig. 1 it will be seen that the stem rapidly becomes subordinated on account of the large size of the branches. In many corrosions the bronchi marked *B*, Fig. 1, break up into leashes of branches of nearly equal size. In fact, it will be found impracticable in the majority of cases to carry the stem further than this point.

FIG. 1.



Corrosion of the bronchial tree of an adult male Esquimau. *T.* Trachea. *L B.* Left bronchus. *R B.* Right bronchus. *A.* First hyparterial bronchus on left side. Its segments, *A' A'*, correspond to *A' A'* on the right side. On the right side the upper branch, *A'*, is the eparterial bronchus, the lower *A'* the first hyparterial bronchus. *B.* Continuation of stem bronchus, dividing into *B' B'*. *C B.* Cardiac bronchus.

As described by Huntington,[1] these difficulties are avoided and a type is given which applies to the bronchial tree of the mammalia in general and better explains its ontogenetic development.

The left bronchus, *L B*, gives off a large branch, *A*, which divides into two secondary branches, *A' A'*. It then continues on as a stem bronchus, *B*, which divides into two branches, *B' B'*. Numerous other branches are given off, but as a rule this type can be recognized.

On the right side the arrangement is somewhat different, owing to

[1] G. S. Huntington. The Eparterial Bronchial System of the Mammalia, Annals of the New York Academy of Sciences, xi. 9, 1898.

the suppression of the branch *A*, due to the migration of one of its segments, *A'*, to the main trunk above the pulmonary artery, thus forming the eparterial bronchus.

According to this hypothesis, then, the eparterial bronchus is the morphological equivalent of the upper segment of *A* on the left side, while the next ventral branch on the right side is the equivalent of the lower segment of *A* on the left side; otherwise the division of the bronchi are the same on both sides, with the exception of the cardiac bronchus on the right side. On the right side the eparterial bronchus supplies the upper lobe of the right lung, the remaining branch, *A'*, the middle; and the lower lobe is supplied by the continuation of the stem *B*.

On the left side the branches *A A' A'* supply the upper lobe, and the lower lobe is supplied by *B*. The left upper lobe is thus seen to be the equivalent of the right upper and middle lobes, which differs from Aeby's conclusion, namely, that the upper lobe of the right lung is not represented on the left side. The first branches given off from the main stem are very large, nearly equalling in size the continuation of the stem. They mark an important point, for here foreign bodies may lodge or even pass into them.

Of the two primary bronchi the right is the larger, and its course is more in direct continuation of that of the trachea than the left. It has a slight curve with the concavity directed laterally. The left courses twice[1] as far as does the right before giving off its first branch. It describes a double curve—the first with its concavity directed upward and outward, over which the aorta and the left pulmonary artery pass, and the second with its concavity directed inward, conforming to the convexity of the heart. Both bronchi are nearer the dorsal than the ventral aspect of the lung. We thus have several causes determining the greater frequency of the entrance of foreign bodies into the right bronchus. First. The greater size of the right bronchus, which not only makes it capable of receiving larger bodies, but also throws the dividing spur between the bronchi to the left of the axis of the trachea. Second. The greater respiratory current. Third. The direction of the right bronchus—*i. e.*, conforming to that of the trachea.

The radiographs and diagrams demonstrate the relations of the bronchial tree to both the posterior and anterior thoracic walls, and in a manner as if one looked through the walls of the chest at the bronchi. Thus the right bronchus is on the observer's left in the anterior views and on the right in the posterior views.

Radiographs were taken of one adult, of children one and two years of age, and of one at birth. The figures are those of an adult chest.

[1] According to Luschka, the right bronchus 2.5 cm., the left 5.1 cm.

At birth the relations do not differ from those of the older children. In young children the sternum is so transparent to the rays that radiographs were obtained only after painting the cartilage with oxide of lead. The diagrams were traced directly from the radiographs, and enough of the cartilages and other structures which were indistinct added to make them recognizable. The important relations are those of the trachea, the primary or stem bronchi, and the points where they

FIG. 2.

Adult male. Relations to posterior thoracic wall.

give off their first branches. It would be superfluous to attempt the relations of the other secondary bronchi.

The trachea, which is in the median line at the lower part of the neck, lies in the right sternal line at its bifurcation, which corresponds to the right side of the centre of the vertebræ posteriorly.[1]

The deviation of the trachea is caused by the aorta, which crowds it

[1] For convenience in description the following perpendicular lines are taken:
1. The median line.
2. The sternal line, along the border of the sternum.
3. The mammillary line, through the nipple.
4. The parasternal line, midway between the sternal and the mammillary line.

to the right side. It bifurcates at about the level of the intervertebral disk between the fourth and fifth thoracic vertebræ, which point corresponds nearly to the tip of the fourth thoracic spine. This point is not absolute, as it is influenced by the respiratory movements and by the position of the head and neck.[1] In the radiograph it is somewhat lower in the adult, but it is as stated in the children. This point in the adult is below the level of the scapular spine—not at that level, as given by Joessel.[2]

FIG. 3.

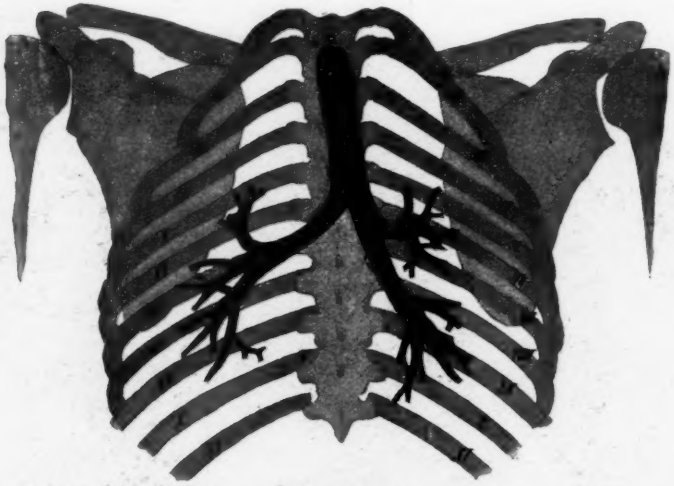


Diagram of Fig. 2.

On the anterior wall of the chest this point in the adult is just internal to the junction of the lower border of the second costal cartilage with the sternum.[3]

In the child, on account of the horizontal direction of the ribs and the consequent greater height of the sternum relative to the vertebræ, the point of bifurcation is under the right border of the sternum at the level of the third costal cartilage.

The stem bronchi, beginning at the bifurcation, end or become so small as to be negligible opposite a point on the posterior thoracic wall at the eighth rib situated in the adult on the left side three inches, and on the right side two inches, from the vertebral spine; in the child one and

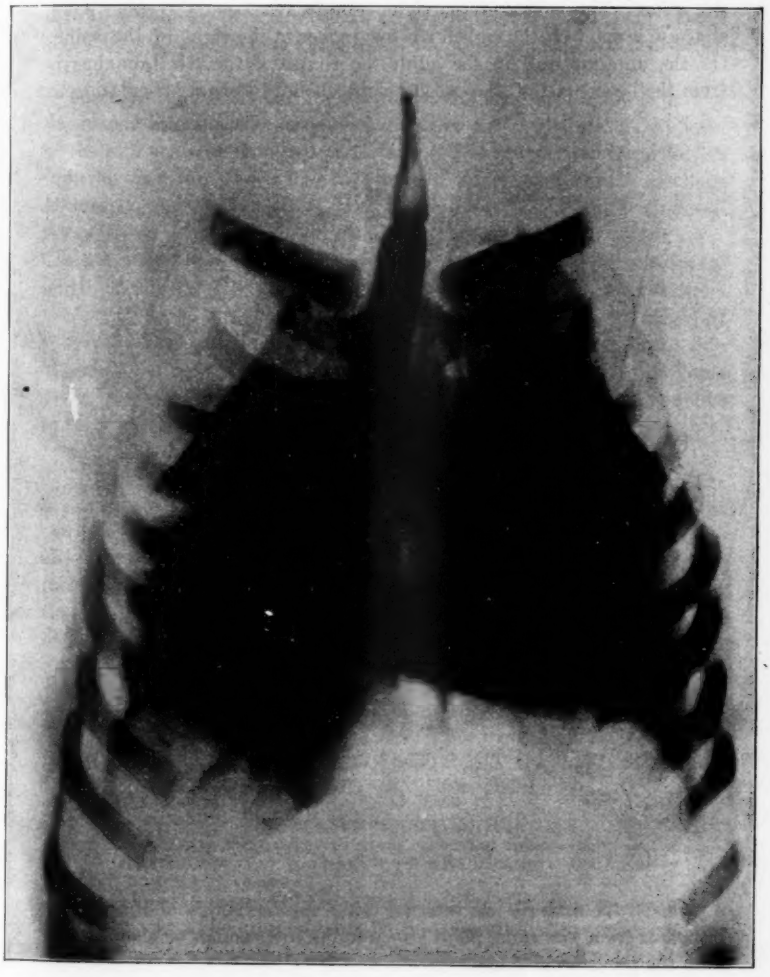
[1] Joessel gives it as opposite the fourth or fifth thoracic vertebra. Joessel. Topographisch-Chirurgische Anatomie, zweit. Theil, erste Abtheil.

[2] Ibid.

[3] The projection of the point of bifurcation in the adult on the anterior chest-wall was confirmed by section on four additional subjects previously formalized.

one-half inches and one inch, respectively. On the anterior thoracic wall these points are situated on the left side at the fifth rib just in-

FIG. 4.



Adult male. Relations to anterior thoracic wall.

ternal to the mammillary line, on the right side at the fifth rib in the parasternal line.

These data enable us to plot out the course of the stem bronchi on the posterior and anterior thoracic walls. On the posterior wall in the adult the course of the left bronchus is from a point to the right of the fourth thoracic spine to a point on the eighth rib three inches to the left of the spine. The course of the right bronchus is from the same point above to a point on the eighth rib two inches to the right of the spine. On the anterior wall in the adult the course of the left bronchus is from the lower part of the second right chondro-sternal articulation to

FIG. 5.

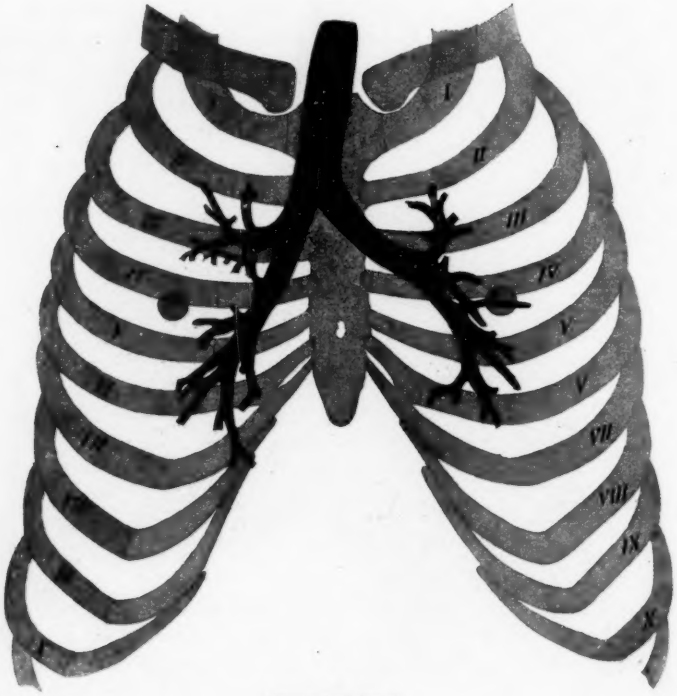


Diagram of Fig. 4.

a point on the fifth rib just internal to the mammillary, and of the right bronchus from the same point above to the intersection of the fifth rib with the parasternal line.

In children the point of commencement of the bronchi, as before stated, is opposite the third chondro-sternal articulation; otherwise the course is the same as in the adult, due allowance being made in the distance of their termination from the vertebral spines posteriorly. In

comparing the direction of the two bronchial trunks the right is seen to correspond very closely with that of the trachea, while the left diverges markedly.

The relations of the first branches of the stem bronchi are approximately as follows, their position in regard to the chest-wall being influenced by the same factors which affect the position of the tracheal bifurcation.

The eparterial bronchus is given off at the level of the lower part of the second interspace or the third cartilage anteriorly, and at the level of the fifth space or sixth rib posteriorly. The first branch from the left bronchus is given off at the level of the third space or fourth cartilage anteriorly, and at the level of the sixth interspace or seventh rib posteriorly.

On account of the double course of the left bronchus the point of origin of the first branch is slightly lateral to the line of general direction of the stem bronchus as given, but on the right side the origin of the eparterial branch may be designated by the intersection of the line of general direction of the stem bronchus with the level given. These points may also be determined by measurements, the eparterial bronchus arising one inch, the first branch from the left bronchus two inches, from the tracheal bifurcation.

The points of origin of the first branches on the two sides differ greatly as to their distance from the median line, being anteriorly on the left side in the parasternal line, on the right midway between the sternal and parasternal lines; while posteriorly the point of origin of the eparterial bronchus is at the right border of the vertebral column, that of the first branch from the left bronchus being two and a half inches from the spines of the vertebræ.

HEMIATROPHY OF THE BRAIN WITHOUT DISTURBANCES OF INTELLIGENCE OR PERSONALITY.[1]

By Pearce Bailey, M.D.,

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The following case has been deemed worthy of record on account of its unique character and because it has important bearings upon the localization of psychic functions.

The patient, a carpenter, aged fifty-seven years at the time of his death, was, according to his own statement, strong and well up to the

[1] From the Department of Pathology of the College of Physicians and Surgeons, Columbia University, New York.

age of forty-seven years. He denied having had the symptoms of syphilis, and said he had not been an excessive drinker. These statements were corroborated after his death. He was married, had several children, and supported his family by his daily labor. When forty-seven years of age or thereabouts he awoke one morning to find the whole left side numb and powerless. The ordinarily severe cerebral symptoms of apoplexy were absent, but the paralysis was complete, so that the face was drawn to the right and the left arm and leg were entirely useless. The face gradually improved; the arm and leg soon began to "stiffen up," but there was little or no return of voluntary power over them, the patient remaining almost absolutely crippled on the left side.

FIG. 1.

Six years after the stroke, having had a variety of hospital experiences, the patient was admitted to the almshouse. For the three years preceding his death he was under my constant observation in the wards of the Hospital for Incurables. With the exception of the face, the paralysis of which had to a great extent receded, he presented the most pronounced type of hemiplegia with contracture imaginable. (Fig. 1.) The toes were bent over on the sole of the foot; the ankle was extended; the flexion at the knee- and hip-joints was so extreme that the posterior surface of the leg touched the thigh, and the anterior surface of the thigh touched the abdomen. The deformities in the upper extremities were of the same character, though less in degree. All the contractures

were rigid in the extreme. Without causing the patient great pain it was impossible to effect over a few degrees of movement in the joints. Division of the hamstring tendons had been done without benefit; mechanical contrivances caused so much suffering that they had to be abandoned.

The paralysis with contracture was the chief physical symptom; there were no defects in sphincter action or in special sense function. The patient complained somewhat of feelings of numbness in the left side, but objective anæsthesia was not demonstrable.

The paralyzed limbs were wasted to a certain extent, but not more than is usual in cerebral palsies. They were not shortened. The tendon-reflexes on the hemiplegic side could not be elicited on account of the contractures. On the other side they were exaggerated.

In contrast to these pronounced physical symptoms, pointing to an extensive lesion in the right half of the brain, was the absence of disturbances referable to the psychic faculties. Speech was perfectly normal; reading was not interfered with; memory was apparently unaffected. Although, unfortunately, no systematic examination of the higher mental attributes was made, I never noticed, in my frequent conversations with the patient during the three years, nor was there ever reported to me by the house-staff or attendants, anything to indicate that the man's character or mental capacity had been affected in any way by the cerebral affection. He was courteous, intelligent, and patient; he was cheerful and attentive, and his power of attention was very good; he read the papers constantly, liked to talk politics, and was interested in the affairs of the hospital. Fully conscious of his infirmity, he bore it bravely. He was singularly free from the periods of depression, of emotional excitement, of irritability, of apathy, or of any other of the manifestations of abnormal mental states so common in gross brain lesions. He was cleanly, and required only such care as his physical infirmity rendered necessary.

In the summer of 1897 he was taken with symptoms of pneumonia, and after an illness of a few days' duration he died. The autopsy showed atheromatous degenerations in the heart and aorta, the gross lesions of chronic diffuse nephritis, and a lobar pneumonia.

Brain. The dura was moderately thickened, especially over the anterior part of the right hemisphere. In this region—the frontal—there was beneath the dura a soft, fluctuating area, which proved to be a cyst in the meshes of the pia. When the dura was removed the covering of the cyst was torn away and a straw-colored serous fluid exuded. The cyst was 6 cm. in diameter.

The left hemisphere was normal in size and in the configuration of the convolutions. The right hemisphere (Figs. 2 and 3), however, was greatly shrunken. The portion of it posterior to the fissure of Rolando was atrophied in the individual convolutions, but the convolutions retained their normal topography.

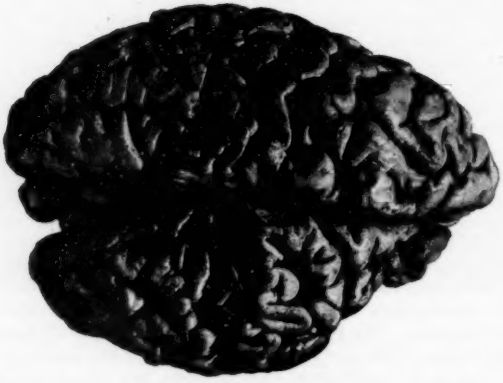
The region anterior to this fissure, and comprising all the frontal lobes excepting that part lying just to the inner side of the olfactory tract (gyrus, rectus, Quain) and the upper half of the precentral gyrus, was occupied by a yellowish-white, semitranslucent, œdematous tissue, overlying a soft mass as a membrane. This mass and its membranous covering, looked at from the side, had an irregular, quadrilateral shape, and measured approximately 3 cm. in length, 4 cm. in breadth, and 1½

to 2 cm. in thickness. Its surface was very uneven, presenting elevations and depressions in such wise as to suggest diminutive convolutions. On section it was found to be dirty white and fibrous, somewhat more resistant than brain tissue, and showing no gray matter.

Thus the macroscopic appearance of the right hemisphere presented, posterior to the fissura centralis, a slight atrophy of the brain substance; while anterior to it nearly the whole frontal region was represented by a shapeless mass.

FIG. 2.

FIG. 3.



Hemiatrophy was also found in the lower-lying segments of the cerebrospinal axis, with the exception of the cerebellum. Both cerebellar hemispheres were of the same size. But the basal ganglia of the right side were atrophic in the extreme; the right half of the pons was fully one-half smaller than the left half; the difference in the two halves of the medulla, while not so marked as in the pons, was very noticeable. Below the pyramidal crossing the atrophy crossed; being found in the left half

of the spinal cord, where it affected both gray and white matter in the whole long axis of the cord.

The anterior commissure of the brain could not be made out; but the middle and posterior commissures seemed normal, as did the cranial nerves.

The bloodvessels at the base of the brain were atheromatous and thickened. No further pathological changes were noticed in the arteries supplying the left hemisphere. On the right side, however, the internal carotid, the middle cerebral, and the anterior cerebral as far as its junction with the anterior communicating, were so much diminished in size as to look like fibrous cords. Their lumen was almost entirely obliterated, that of the internal carotid measuring only ½ mm. in diameter. The anterior cerebral artery, after its anastomosis with the anterior communicating, regained its normal size; hence the preservation of the gyrus rectus above described as persisting. The cerebellar arteries, both anterior and posterior, were normal.

Microscopical Examination. Pieces from the mass occupying the position of the frontal lobes on the right side, and from various parts of the cortex of both hemispheres, were examined microscopically according to the Nissl method. The membrane covering the mass proved to be the thickened pia. The mass itself consisted of connective-tissue cells and fibres and of a very friable, amorphous matter, which contained blood-pigment; but there were no traces of ganglion cells recognizable as such. In the left hemisphere the ganglion cells from the frontal region, from the anterior and posterior central, from the parietal lobules, and from the cuneus, seemed normal in number and arrangement. They showed only such slight changes in appearance as are generally demonstrable by the Nissl method when death has been due to pneumonia. In the right hemisphere, however, the cortex was in great part bereft of its cellular elements. Most of the ganglion cells which could be identified as such were greatly reduced in size, all were defective in their staining properties, and only a few retained the normal arrangement of nucleus and Nissl bodies, such as was retained on the left side. The large, pyramidal cells were almost totally absent. There was a considerable number of small, homogeneous masses, which were interpreted as remnants of ganglion cells, but even if these were counted with the ganglion cells which were recognizable as such, the number of ganglion elements would still be very much below normal. The disappearance of the cortical cells was most pronounced in the upper part of the precentral convolution. In the posterior regions of the cortex more cells were present, but even the cuneus of the right side, as compared with that of the left, was strikingly deficient. Further examination with the microscope showed an obliterating endarteritis of the cerebral bloodvessels. In the right internal carotid and right internal cerebral this was particularly severe, so that the lumen of these vessels was almost obliterated. There was a descending degeneration in the spinal pyramidal tract on the left side, and a generalized diminution in volume of the whole left half of the cord. Putting all these facts together, we have the following: A presumably previously active man becomes hemiplegic on the left side. Useful recovery in the limbs does not occur, but the man manifests nothing to indicate that the power or operations of the mind have been affected. Yet, after death, the whole of one hemisphere is found to be greatly lessened in size and impoverished in cellular constituents, and

the frontal lobes, which are regarded as the seat of the highest cerebral functions, are almost totally annihilated on one side. The lesion was undoubtedly acquired, and its production can best be explained by assuming a thrombosis or embolism in the right internal carotid artery.

The feature of greatest interest in this case is the destruction of the frontal region of one side without any mental deterioration. In the rest of the corresponding hemisphere, ganglion cells, though changed in size and number, persisted, and it is impossible to say how seriously their functionating power was interfered with. But the frontal region, with the exception of parts of two small lobules, had unquestionably been deprived of all usefulness.

There is considerable experimental and clinical evidence in favor of the hypothesis that the frontal lobes have important synthetizing functions; that in them are gathered up and co-ordinated the results of activity in other parts of the brain; that they are an important central station; that when they are destroyed the individual's "psychical personality" becomes defective. This has been well enunciated by Bianchi,[1] who says, in the conclusions drawn from a series of very careful experiments carried out on dogs and monkeys:

"My hypothesis is that the frontal lobes are the seat of co-ordination and fusion of the incoming and outgoing products of the several sensory and motor areas of the cortex. . . . They would thus sum up into series the products of the sensorimotor regions, as well as the emotive states which accompany all the perceptions, the fusion of which constitutes what has been called the psychical tone of the individual."

In clinical cases, lesions in the frontal region have been especially noted as causing mental apathy or stupidity and changes in character. Williamson,[2] in an analysis of fifty cases of tumors of the prefrontal region, found in thirty-two, or 64 per cent., "a condition of mental decadence, loss of power of attention and loss of memory, loss of spontaneity; the patient takes no notice of his surroundings, sleeping during the greater part of the day or being semi-comatose."

Jastrowitz[3] proposed the term *Moria* as a designation for these peculiar character changes which he regarded as highly suggestive if not pathognomonic of frontal lesions.

Oppenheim supplemented this with "Witzelsucht," or the tendency to make jokes (usually bad ones), which he observed in these cases. This symptom was observed in lesions both of the right and left side; and indeed Oppenhiem[4] has since found it in a case of brain tumor in which the tumor was in the temporal lobes.

The evidence that the character changes of frontal lesions are more

[1] Brain, xviii. p. 591.
[2] Brain, xix. p. 346.
[3] Deutsche med. Wochenschrift, 1888.
[4] Die Geschwülste des Nervensystems. Nothnagel's System.

constant, depending upon whether the lesions are right- or left-sided, is contradictory. Seguin noticed that they were more frequent in left hemiplegias—*i. e.*, in right-sided lesions. Phelps[1] analyzed twenty-eight cases of laceration of the frontal lobes confirmed by autopsy. The laceration involved the left frontal lobe in eleven, the right in seven, and both lobes in ten. He says:

"In the eleven cases in which the laceration was confined to the left lobe there was mental aberration or deficiency, apart from mere stupor or delirium, in every one; while in the seven in which the laceration was confined to the right lobe it was observed in none. In the ten cases in which frontal laceration involved both lobes . . . specific mental disturbance . . . was observed in eight."

Bianchi noticed no mental disturbances when one side of the frontal region was left undisturbed. The case which I have reported shows that the frontal lobes of one side (the right) may be totally destroyed without evident disturbances of mentality or changes in character. The possibility suggests itself that the peculiar synthetizing function of the frontal lobes is to be sought exclusively neither on the right side nor the left, but that it is bilateral; that, under certain circumstances, this function can be assumed and successfully carried out by the lobes of one side only.

[1] Traumatic Injuries of the Brain, New York, 1897.

REVIEWS.

DISEASES OF WOMEN: A TREATISE ON THE PRINCIPLES AND PRACTICE OF GYNECOLOGY, FOR STUDENTS AND PRACTITIONERS. By E. C. DUDLEY, A.M., M.D., Professor of Gynecology, Northwestern University Medical School; Gynecologist to St. Luke's Hospital, Chicago. With 422 illustrations, of which 47 are in colors, and 2 colored plates. Pp. 637. Philadelphia and New York: Lea Brothers & Co., 1898.

MEDICAL literature is experiencing a return to books by one author and in single volume. The many systems which have been extensively published possess advantages and disadvantages, and have had an abundant opportunity. Students and practitioners welcome the single volume by one author because it is more coherent than a partnership book. It possesses the attractiveness of personality, while its teaching is almost invariably more direct and concise. Systems must always be valuable for reference, as in each several sections are always more valuable than others, and these are monographs which must be frequently consulted; but the working physician and the student naturally use the smaller book.

Before the appearance of Penrose's *Gynecology* there was no modern and complete book by one American author upon this subject. There was abundant room for a book by an author thoroughly taught in the older school and yet well up in the newer knowledge upon this subject. Dr. Dudley's training and experience have fitted him admirably for the task he undertook.

He has produced an original, interesting, and thoroughly scientific book upon this subject, and one well illustrated. While the book is designed to be a practical treatise, and certainly is such, it is founded upon pathology. In the matter of sequence, he has endeavored to pay due attention to etiology. Some of the conditions usually treated of as diseases are clearly described as symptoms only. For example, he discusses metritis in close association with infection of the entire genital tract rather than as a distinct and independent lesion. Displacements of the uterus result from inflammation, tumors, and traumatism, and hence are placed after them. The illustrations are excellent, many of them from orginal drawings which show clearly what the author intends.

The first section of the book is devoted to general principles. The author first treats of the physiological periods in the life of woman and draws attention to the fact that the common observation that uncivilized woman is stronger than her civilized sister is a fallacy. The educated woman could, if necessary, "resume the march" after parturition, as proved by some notable examples in history. While the savage woman is old and withered at thirty, the high-class civilized woman preserves something of youth until after the age of fifty.

In Chapter II. the writer discusses antiseptic methods and antisepsis. A brief but clear review of the bacteriology necessary for a practical understanding of the subject is given, and there are illustrations of apparatus and many practical hints of decided value. He pays full attention to asepsis of minor manipulations, and closes his chapter with a word of caution or protest against infection from meddlesome office gynecology.

His description of diagnosis is complete and thorough and abundantly illustrated.

Local treatment is then considered, and minor operations are described in detail, and with especial clearness the methods of plastic surgery devised by Emmet. We are a little surprised to find included in this book an account of dilatation of the uterus by means of tents. We had supposed that dilatation by gauze packing, by graduated sounds, or by some sort of glove stretcher dilator had rendered unnecessary the use of tents. In describing the curette several forms of instruments are illustrated, some of which, in our experience, are very undesirable. The sharp spoon curette perforated for continuous irrigation is not mentioned. This, however, we believe to be the best instrument for this purpose.

A full discussion of major operations comes next in order. The writer considers the subject of drainage so important that he has given it a chapter, and his views upon the question of drainage are summarized by the terse statement, "when in doubt, don't drain." The after-treatment of these cases receives adequate attention.

A separate chapter upon the relation of dress to the diseases of women completes Part I. of this volume.

In Part II. the writer discusses inflammation, and this is an excellent chapter upon a subject often treated in an obscure manner. The distinction between infection and inflammation is clearly drawn, and the important part which chronic vices in the nutritive process play is well set forth.

Inflammation of the uterus is certainly one of the most important subjects dealt with in a book of this character. The writer devotes one chapter to general considerations and then treats of acute metritis. His previous chapters upon inflammation and his very clear descriptions of pathological processes in the vagina have prepared the way for this very important topic. He urges the thorough use of the sharp curette where curetting is indicated. He adds, however, a wise caution against the performance of this dangerous operation in an acute case. In chronic metritis and chronic endocervicitis he describes the appropriate operative measures necessary for these conditions. He advises Schroeder's operation for chronic endocervicitis.

Chronic endometritis is discussed at length. A great and appropriate importance is placed upon the systemic condition of the patient. Excellent advice is given regarding her treatment.

Most important, however, is the author's warning regarding topical treatment. He states that he has for years used the vaginal douche, the swabbing out of the uterus with cotton, the injection of astringents, the vaginal and intra-uterine applications of dry powders, intra-uterine pencils of various alterative and caustic substances, wool-glycerin tamponade, electricity, and intra-uterine gauze tamponade. In his hands the diligent and patient use of such means has given much disappointment, to say nothing of some positive harm. In his opinion, "a re-

proach will be lifted from the medical profession when its indiscriminate use shall have been relegated to the dark ages of gynecology." He draws attention to the danger of using the sound. This subject is brought to a conclusion by a chapter upon the chronic inflammations of the uterine muscle.

Next in order the writer considers pelvic inflammation. He discusses pelvic cellulitis under that name, because he believes that the pelvis contains cellular tissue which frequently becomes diseased. This naturally leads in the following chapter to the description of inflammation of the uterine appendages, including pelvic peritonitis. Especial attention is paid to diagnosis; the non-operative as well as the operative treatment receives full attention.

The writer proceeds to treat disorders of the urethra, bladder, and pelvis of the kidney in a clearly written chapter which embodies the result of the most recent work upon this subject.

In Part III. are treated tumors, tubal pregnancy, and malformations. An excellent description is given of uterine myomata, reinforced by several valuable illustrations. In the matter of treatment, to which a separate chapter is devoted, the author finds that ergot is valuable chiefly during menstruation to control hemorrhage and preserve the vitality of the patient until relief may come with the menopause or the surgical removal of the tumor. For profuse hemorrhage he prefers intrauterine tamponade with a continuous strip of aseptic gauze. Although he has faithfully tried the electrical treatment of myomata, he reaches the conclusion that the survival of the electrical method depends chiefly upon the patient's ignorance of its inadequacy and dangers, upon her worship of the mysterious, upon an unreasoning dread of operative measures, and upon a desire to grasp any other promising means of relief. This sentence expresses admirably, we think, the view held by the majority of those who treat disorders of women.

As regards surgical treatment, the writer has little confidence in ligature of the uterine arteries and broad ligaments. The authors of this method, he observes, preserve of late an ominous silence upon this subject. Removal of the ovaries and Fallopian tubes for myomata has become an obsolete operation, in his opinion. He prefers radical vaginal operations when the tumor is readily accessible by that route, and believes that the operation of traction and morcellation will become more and more the choice of operations in place of hysterectomy. He warns against this procedure, however, when the case is complicated by tubal abscess. He has suggested an improvement in gaining access to these tumors for their removal; a circular incision in front of the uterus separating the vaginal wall from the cervix, followed by division of the anterior vaginal wall and the anterior wall of the uterus longitudinally in the median line, to gain access to the tumor. For this procedure he claims distinct advantage over lateral incisions of the cervix. So far as the treatment of the stump is concerned in hysterectomy, he recognizes the intraperitoneal treatment as the established method, and gives credit to Baer, Eastman, and others for their work in this field. In case of a large tumor he has had success in preserving the uterus by opening it after abdominal section, removing the tumor, packing the uterus and vagina with gauze, and closing the uterus by layers of suture.

A short chapter is devoted to benign adenoma, and then carcinoma is taken up. As regards the treatment of this condition, he believes

hysterectomy is indicated if the uterus is normally mobile, if no enlarged glands in the parametria are present, and if the vaginal walls are not involved. He gives a full description of vaginal hysterectomy, with some very good illustrations.

In the portion of the book devoted to sarcoma is included a brief but clear account of our present knowledge regarding deciduoma malignum. In the discussion of ovarian tumors he writes fully and clearly upon the secondary changes in these tumors and diagnosis and treatment by operation, urging timely ovariotomy for ovarian tumors complicating pregnancy. He believes that all ectopic pregnancies are primarily tubal, and that the causation of this condition is as yet a matter of speculation. He finds that in tubal pregnancy the tubal mucosa plays a very insignificant part, the placenta being almost entirely derived from the embryo. He denies the old notion that a free embryo could escape and engraft itself upon the peritoneum.

Part IV. is devoted to traumatisms, and laceration of the perineum and perineal region is taken up extensively. He gives an illustration of the proper site for episiotomy, which does not agree with the teaching of many text-books upon obstetrics. He believes that the recto-vesical fascia is sufficient, when intact, to support the pelvic organs. He writes fully of perineorrhaphy and contributes a series of diagrams illustrating his views. He urges the operation of Emmet, using silk-worm-gut as suture and placing the ends of the sutures within the vagina after operation. The illustrations of this portion of the book are excellent, and the whole description is one of the best which we have ever seen.

It is natural to expect that in treating laceration of the cervix uteri and its results the well-known procedure of Emmet should receive full description. The author, however, does not content himself with simple closure of the cervix, but curettes the uterus first, then closing the cervix. Is it not possible that much of the benefit derived from the two procedures in cases in which the cervical laceration is not extensive may be caused by the curetting? The writer agrees with those obstetricians who urge immediate closure of the torn cervix after labor when profuse hemorrhage is present. He is inclined to doubt whether accurate approximation can be made in these cases and whether it is not better to wait until the patient has recovered from labor. We cannot agree with him in this, as in hospital work we have for several years instructed our assistants to close all considerable tears of the cervix by suture. In the great majority of these patients satisfactory union has followed. In some cases we have used the continuous catgut suture, and in others the interrupted suture with chromicized catgut.

In treating of vesico-vaginal fistula the fact is emphasized that it is not the proper use of obstetric forceps which causes this injury, but the neglect to employ it in proper cases. Failure to empty the bladder by catheter at frequent intervals during prolonged labor is also a cause of this complication. In describing the surgical treatment of this condition the writer urges the importance of preparatory treatment, and lays down the rule that, when the parts are in a healthy condition and all phosphatic deposits have been removed, suture should never be introduced unless the surfaces to be united can be held in contact without traction. If such be not the case, the plan of operation must be so modified that traction is completely avoided. He illustrates the correct

method of denudation and also the incorrect, borrowing for the latter purpose a cut taken from a standard work. Other forms of genital fistulæ receive careful attention.

The author divides displacements of the uterus into those of location and those of position. He gives precise directions for making a diagnosis in these cases. In treating of prolapse he emphasizes the fact that elongation of the cervix seldom exists in these cases, but that the condition present is one of temporary engorgement, which disappears when the womb is replaced. He urges, in puerperal cases, the replacement of the uterus, if necessary, before the patient leaves her bed. An operation original with the author, known as lateral elytrorrhaphy, is described for the relief of prolapse, and the results thus obtained have been satisfactory to the writer.

In treating of retroversion and retroflexion the author urges the value of pelvic massage in suitable cases. He believes that the ordinary retroversion pessary should be inserted transversely in the vagina, and not, as is usually done, in the antero-posterior axis of the vaginal outlet. He illustrates clearly the wrong and the right method of this common manipulation. While the properly adjusted pessary gives the patient no consciousness of its presence, its dangers in inefficient hands are in striking contrast with its usefulness. The operative treatment of backward displacements is fully considered, and in cases where pregnancy may occur vaginal fixation of the uterus should not be employed. The field for Alexander's operation is a limited one, the preference being given to abdominal hysterorrhaphy. The author also describes an original operation for marked anteflexion, and illustrates it fully. It consists in incising the lips of the cervix, excising wedge-shaped portions, and so bringing the parts together as to straighten the canal. His experience numbers about fifty cases, with 100 per cent. of anatomical cures and 75 per cent. of symptomatic cures. He concludes this portion of the book by a chapter upon inversion of the uterus. The volume is brought to a close by an elaborate chapter upon pelvic massage, fully illustrated. The writer does not consider it a panacea, but a rational therapeutic agent for the relief of many conditions for which there is no other equally good remedy.

In concluding our review of this volume we have been impressed with the strong effort made by the author to treat his subject from the standpoint of modern medical science. As the science of pathology has advanced so remarkably, it has made modern medicine largely a pathological study. The writer's classification of the conditions treated of in his book will not be acceptable to many readers. It is at first unfamiliar, and we miss old acquaintances in accustomed places; but if we are to write in accordance with the latest and best knowledge obtainable, then some such arrangement of text-books as that in the present volume must inevitably be adopted. We believe the arrangement a good one, and that it will greatly enhance to the student and practitioner the value of the book.

A striking feature of the work is its originality. Not only is the arrangement original, but operative and other procedures which the author has published in papers previously are embodied in this work. It has also the decided merit of clear, logical, and positive statement, and gives no uncertain tone regarding the choice of methods of treatment. While the author shows loyal allegiance to the work of the

past, he is distinctly in the line of advance in all reputed methods in this branch of medicine. This book is a thoroughly modern text-book of striking value and a distinct acquisition to the literature of the subject.

E. P. D.

TRAUMATIC SEPARATION OF THE EPIPHYSES. With a Skiagraphic Atlas, Reproducing the Skiagrams Showing the Ossification of the Bones of the Hand and Wrist. By JOHN POLAND, F.R.C.S. London: Smith, Elder & Co. (Imported by G. P. Putnam's Sons, New York), 1898.

IT is not too much to say that this work contains all that is known upon the subject of which it treats. It is not, however, merely an elaborate collection of cases or a compilation of the opinions of others, but in addition has the great merit of embodying much original work by the author upon the basis of the Röntgen rays, some of the results of this work being a considerable modification of views hitherto held as to the evolution of the ossification of some parts of the skeleton. After an elaborate historical introduction and a most interesting chapter on the anatomy and connections of the epiphyses, the general subject of epiphyseal separation is considered from various stand-points.

As to *etiology*, the general rule is advanced that, taken as a whole, the causes which produce these lesions are the same as those of fracture, but as a rule they are more severe. An injury which would be sufficient to produce a dislocation in an adult will in the child produce a separation of the epiphysis; epiphyseal separation in the child may indeed be called the analogue of dislocation in the adult. Of course, a lesser degree of violence applied to an epiphysis in a young subject with some constitutional affection is often sufficient to cause its separation without producing any displacement.

Emphasis is placed upon the importance of lesions of the juxta-epiphyseal regions in young children often following directly upon violent movements. Although not apparent from the outside, they are yet important lesions, since they are the immediate or remote cause of various inflammations of the bones or joints. Such lesions are of especial importance in children predisposed to tubercle or who have suffered from septic poisoning. Many of the pains called "growing pains" are due to juxta-epiphyseal sprains or injury. A juxta-epiphyseal sprain is often nothing but the first degree of an epiphyseal separation, in the same way that an articular sprain is nothing but the first degree of dislocation.

As to *frequency*, from statistics the author has given in each chapter it is clearly proved that these accidents are less common in early childhood than after the age of eleven or twelve. This is contrary to what has commonly been conjectured by former writers, viz., that young children are most frequently affected with traumatic epiphyseal separations. The belief probably arose from the fact that the epiphyses at this early age are considerably larger in proportion to the diaphyses and less strongly united to them than they are at a later period. In reality, the period from eleven or twelve to eighteen years of age is the one in which these injuries are most likely to be met with, which fact is

largely due to the circumstance that children at this age are more exposed to severe injuries such as are likely to cause epiphyseal separations.

As to *sex*, the extraordinary preponderance of males, which has long been known, is shown by the author's figures to be even greater than has been supposed. Out of the total number of cases (345) the sex is stated in 289 as 247 males and 42 females, all except three of the latter being at or below the age of puberty. After puberty, probably on account of the greatly diminished exposure to violence in games, plays, etc., traumatic separation of the epiphyses is almost unknown in females. The estimate of the relative frequency with which the different epiphyses suffer from this accident is of interest, but cannot be regarded as of permanent value until a larger number of cases have been accurately observed and recorded.

Mr. Poland says that "from practical experience one is led to the belief that separations of the lower end of the humerus in their various complicated forms are perhaps the most frequent.

"The epiphyses of the upper limbs are much more often involved than those of the lower. The author's figures are 426 in the upper extremity and 267 in the lower extremity."

After the lower epiphysis of the femur the lower epiphysis of the radius stands next in order of frequency in the number of specimens that can be shown, whereas at the upper end of the humerus there are few specimens compared with clinical cases. The fallacy lies in the fact that at the lower end of the femur the injury is more frequently followed by serious complications, amputation, or death.

The chapter on *pathology* deals with the varying character of the separations and with the associated lesions. After examining the museum specimens of epiphyseal separation contained in the London hospitals and the recorded cases of compound separation in which the condition of the separated fragments could be clearly seen, the author came to the conclusion that as a bone approaches a certain period in its development the traumatic separation would be of a more simple character. "In each long bone there is a *certain period* peculiar to its epiphyseal ends in which traumatic separation of the epiphysis is of a pure character, uncomplicated by fracture; *below this period*, but more especially *above*, the liability of the separation being accompanied by racture becomes manifest."

In numerous experiments on the dead subject the author arrived at a precisely similar conclusion with regard to all the epiphyses of the long bones. A period is reached in each end of a bone when the epiphysis is fairly ossified and developed, and likewise the end of the diaphysis, leaving a weak point along the epiphyseal line of cartilage. The separation is then a pure one. When, however, the epiphysis is approaching the time of its complete union with the diaphysis, the separation will most probably be accompanied by a fracture of a portion of the diaphysis.

The summary of the *symptoms* and the *diagnostic points* of these injuries will bear some quotation. Mr. Poland begins by saying that "in their symptoms epiphyseal separations have more resemblance to dislocations than fractures." He adds: "The only symptom upon which reliance can be placed is the existence of unnatural mobility in the bone at the point where anatomy informs us the epiphysis is united to

the shaft, in the immediate neighborhood of the conjugal cartilage, always recollecting that this line in the same bone alters its position in the different periods of infancy and puberty. This mobility of a limb after obstetrical manipulations or rough handling of an infant should suggest at once an epiphyseal separation. When the periosteum has been stripped up or lacerated and permits displacement, the mobility will be even more marked and easier of detection in certain cases than in ordinary fractures, by reason of the regularity of the separated surfaces and the absence of all tooth-like projections."

Swelling and ecchymosis have nothing characteristic; but pain as a symptom of separated epiphyses is of great practical use, as it indicates the precise spot where the solution of continuity exists, viz., at the diaphysio-epiphyseal line. It is especially valuable in separations caused by indirect violence or muscular action rather than by direct violence, where there is great contusion and consequently great pain over a considerable area. In fractures near the joints or in separation of the epiphyses the pain is generally greater than in fractures elsewhere.

Deformity may be diagnostic if it is not obscured by swelling. The anatomical knowledge of the surgeon will lead him to recognize the shape of the displaced epiphyses or of the projecting edge of the end of the diaphysis.

The *prognosis*, as regards the subsequent growth of the bone after separation of its epiphyses, is of the greatest importance to the practical surgeon. This growth is not of necessity interfered with, because the epiphyseal cartilage performs its function in many cases as perfectly as before the injury.

Many instances of dwarfing of the limbs have been recorded as the result of epiphyseal injuries, but the most marked cases have occurred after injury to the upper epiphysis of the humerus. In this instance, as in other epiphyseal separations, the wasting and diminished growth of the limb are in part dependent upon the loss of the natural function or diminution in the use made of it, the result of anchylosis of the joint.

As might have been supposed, arrest of growth occurs most often at the upper epiphysis of the humerus and at the lower epiphyses of the femur, tibia, and radius, by reason of the late period of their union with the diaphyses and their being the most frequent seats of separation.

It is probably true that the reason these injuries are so seldom followed by arrest of growth is that the separation seldom occurs in the conjugal cartilage itself, but rather in the ossifying or ossified, spongy tissue which immediately adjoins the cartilage, and a certain amount of which always clings to the cartilage; again, that these injuries often occur still further toward the diaphysis, viz., in the juxta-epiphyseal spongy tissue.

The general principles of *treatment* do not differ materially from those governing the treatment of fractures near joints; the complications must be met in the same manner; reduction of deformity must be early, and if necessary must be accomplished by operation. Immediate massage is very properly not regarded with much favor.

The remainder, and by far the greater part of the book, is taken up with discussion of the recorded cases, the symptoms, and the treatment of the separations of the special epiphyses. It is by far the most thorough and comprehensive collection of cases yet brought together.

In the main the author's views as to all practical points are well founded and worthy of adoption.

The book is beautifully made, and the illustrations, especially the skiagrams, are admirable. Mr. Poland is to be congratulated on having made a notable addition to surgical literature and as having well and thoroughly met a want which has been recognized for years by practical surgeons, and especially by surgical teachers.

J. W. W.

A Clinical Treatise on Diseases of the Breast. By A. Marmaduke Sheild, M.D. (Cantab.), F.R.C.S. New York: The Macmillan Company, 1898.

Several eminent surgeons have written upon diseases of the breast (Velpeau, Bryant, Birkett, Williams, the younger Gross), but a thoroughly modern treatise was greatly needed, and one written by such an accomplished surgeon as Marmaduke Sheild is to be warmly welcomed.

This subject is often slighted in our works upon surgery. In one of the most authoritative of modern text-books, a work which consists of three large volumes, the entire subject of diseases of the mammary gland is dismissed in about twenty-five pages. The book before us consists of some 500 pages. It is well illustrated, clearly written, and embodies the great practical experience of a surgeon who has studied this subject long and well. The profession is aware that Mr. Sheild has been for some time investigating these diseases, and our readers will recall his valuable paper upon abscess of the breast (*Lancet*, May 2, 1896) and his important contribution on the diagnosis of cancer (*British Medical Journal*, May 30, 1896). The first chapter of the book before us deals with anatomy and physiology. The author calls particular attention to the fact that the outline of the breast is not sharply defined, but from the gland a number of cusps or processes pass off in different directions. Some of the extensions pass toward the axilla, two or more to the margin of the sternum, and, as Heidenhain pointed out, submammary prolongations may actually pass through the pectoral fascia. In an operation for carcinoma all of these outlying portions must be removed. In describing the lymphatics of the breast he summarizes the well-known views of Stiles, which were published in the *Transactions of the Edinburgh Medical Chirurgical Society*, vol. xi.

The chapter on acute mastitis and abscess is extremely valuable. Sheild believes that a vast majority of abscesses in either sex are due to the entrance of pyogenic organisms through an abrasion and their passage into the lymphatic ducts. Entrance of organisms into the milk ducts he does not regard as a probable cause. In many cases an abrasion cannot be detected by means of the naked eye, but can be discovered if a lens is used. Abscesses in nursing women can be prevented to a great extent by keeping the mother's nipple and the child's mouth clean. The author objects to the incision radiating from the nipple on the upper surface of the gland, which is so usually employed by surgeons. Such an incision produces an unsightly scar, does not afford good drainage, and will not cure the "abcès en bouton de chemise" of Velpeau. Sheild makes a radiating incision on the under surface of the breast, entering the knife at the thoracico-mammary junction.

The chapter on chronic mastitis should be read with care. Cases of chronic mastitis are often confounded with cancer. Some surgeons maintain that cancer can arise from chronic mastitis. We have never thought it probable, and feel strengthened in this view on reading Sheild's statement that reported cases in which this evolution is thought to have taken place were cancerous from the first. If in a case the diagnosis is in doubt our author advises us to apply medical treatment and wait for a time. Mastitis will remain stationary or improve, but cancer will steadily advance. Some surgeons when in doubt always remove the breast. This solution is easy for the surgeon, but is not exactly a satisfactory solution for a conscientious and scientific man. In general mastitis with cyst formation Sheild wisely advises us to remove the breast. The author tells us that Paget's disease can appear on other parts than the nipple. He looks upon it as a superficial epithelioma of the skin, does not think it is ever really cured by local remedies, and maintains that it should be treated by removal of the breast and clearing out of the axilla. The chapter on cancer is extremely valuable and the section on diagnosis is particularly useful. Sheild believes that the modern view as to the necessity for radical operation comes really from Moore's paper, which was published in 1867. It is pleasant to find that the author gives credit to the valuable labors of the younger Gross, who, during many years and in spite of virulent opposition, advocated most forcibly radical operation.

Sheild does not think that we can ever promise cure to a patient, but he is certain that in very many instances we can prevent local recurrences and can prolong the individual's life for several or even many years. The reviewer's experience as to the patient's future is in accord with the views set forth by Sheild, who feels more gloomy as to a patient's future than does Halsted or Cheyne, because he is persuaded that even after three years has passed cancer may appear in some distant part.

Sheild maintains, and we think justly, that the most thorough operations should be performed in early cases, because in early cases there is a chance to cure, and even in early cases the mamma is diseased throughout, and all of its cells show a tendency to reproductive activity. The very small mortality of this large operation is commented on. His operation is radical, but less radical than Halsted's. He does not operate for atrophic scirrhus, for cancer en cuirasse, or if the glands of the neck are involved.

This is a most useful book. In every line it bears the mark of a surgeon who has seen and studied what he speaks of, and whose views are founded on the solid rock of experience. We commend it warmly. We shall keep it in a convenient place in our library, and will constantly refer to it in the future. J. C. Da C.

THE DISEASES OF THE STOMACH. By WILLIAM W. VAN VALZAH, A.M., M.D., and J. DOUGLAS NISBET, A.B., M.D. Illustrated. Pp. 674. Philadelphia: W. B. Saunders, 1898.

THIS joint production of Drs. Van Valzah and Nisbet is written in a scholarly style and undoubtedly possesses what the authors claim as

the chief excuse for its existence—individuality, although whether this latter—a feature evident throughout—renders the work the more valuable as a practical text-book for the general physician may be somewhat called into question. So far, however, as concerns the completeness of the book in useful information forcefully presented, it is most praiseworthy. That points for minor criticism exist concerning the exactness of certain diagnostic and therapeutic statements is not surprising, for what treatise on general or special medicine in its first issue is without blemish in this particular? Those that we note are of too little importance to detract from the usefulness of the work or to permit of the consumption of undue space for special notice. One general criticism must be made, that in the endeavors of the authors to approach completeness the work has been rendered so comprehensive as to appear somewhat impracticable. It is a fact that such an amount of unnecessary matter has to be gone over to obtain the gist of a subject as to render the task wearisome to those who may have to consult its pages frequently. It is fortunate that no endeavor was made to enter into historical description or to give the complete literature of modern work in this field. Had this been done the book would have been voluminous indeed. This extreme minuteness is particularly evident in the second section, that on diagnosis and diagnostic methods, which portion we cannot regard as the most valuable in the work. This section, with the third—that on general medication—of real practical value, constitutes the first part of the volume (the first section is merely introductory), and occupies 261 closely printed pages. In the remaining portion the special diseases of the stomach are considered. These sections are well written and practical.

It seems a mistake in a book intended for the general physician to put forward newly coined terms denominating the secretory disorders characterized by heightened and by diminished function. These are already too abundantly named—the one as hyperchlorhydria, hyperchylia, super- or hyperacidity; the other as hypochlorhydria, hypochylia, or subacidity. The authors invariably speak of these as *adenohypersthenia* and *adenoasthenia gastrica*. These terms, although self-explanatory and etymologically exemplary, are unnecessary, and may easily tend, at least momentarily, to confound the reader encountering them as diseases new and unfamiliar throughout the book.

The authors are strongly to be commended that, at the outset, they emphasize a fact too little grasped by the self-styled "gastro-enterological specialist," who, after a course in the special diagnostic manipulative procedures in this branch, becoming fairly skilled in the passage of a stomach-tube and the simpler chemical analytic methods, too often regards himself as now possessing a past-master knowledge of the subject—an error his victims often appreciate earlier than himself. It is truly remarked by the authors "that the diagnosis of a disease of the stomach includes more than a knowledge of the pathological chemistry of digestion. The unhealthy variations of the gastric juice, the perversion of the motor function, the little variations in the quantity of the hydrochloric acid secreted or left free, occupy too much and too exclusively the minds of some practitioners." D. D. S.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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A Case of Acute Diabetes Mellitus.—Böhm (*Münch. med. Wochenschrift*, 1898, No. 36) observed the following interesting case: A youth, aged seventeen years, pupil in a military school, noticed symptoms of malaise and depression, headache, dizziness, increased thirst, and excessive secretion of urine during the Christmas vacation. The father died at forty-three years of age, of dropsy and cancer of the liver; the mother and two brothers were well. Examination on January 13th showed bronchitis with slight elevation of temperature; pallor and emaciation; the urine amounted to 5500 c.c. in twenty-four hours; specific gravity 1030; no albumin, but 4.9 per cent. of sugar. Diet had no evident effect on the urine. On January 17th the patient went into diabetic coma and died at the end of twenty-four hours.

Autopsy revealed œdema of the brain, acute internal hydrocephalus, hypertrophy and dilatation of the heart, bronchitis, subacute parenchymatous and interstitial nephritis, and atrophy of the pancreas (36 grammes in place of 80–100). The alteration in the kidneys showed that the disease was older than the history seemed to indicate, though not, perhaps, very much. Through his increased appetite and good digestion the patient had been able to prevent a loss of weight and appear well at the monthly medical inspection of the school. The atrophy of the pancreas is of great interest.

Tetany in Dilated Stomach Not Always Associated with Ulcer and Hyperchlorhydria.—Sievers (*Berliner klin. Wochenschrift*, 1898, Nos. 31 and 32) reports two cases of tetany which occurred in connection with dilated stomach. Both were fatal, and in both there was stenosis of the pylorus from healed ulcers, and consequent enormous dilatation.

The author has investigated all the reports of fatal cases, twenty-seven in number, in order to control the theory of Bouveret and Devic, according to which tetany is always associated with hypersecretion. In most of the reported cases there was dilatation due to stenosis from the scars of pyloric or duodenal ulcers, or else there was ulcer or scar without stenosis. But in some cases these were not to be found, and in some of these hydrochloric acid was not present during life. In three cases carcinoma had developed in the edge of the healed ulcers. In all these cases the tetany occurred late, when the hydrochloric acid was probably diminished as compared with the earlier period. Sievers explains the coincidence more naturally by pointing out that in stenosis from healed ulcers the most extreme forms of dilatation occur, and, according to the toxic theory, these offer a better opportunity for the toxic substances to form than do the milder cases.

The Heredity of Tuberculosis.—G. HAUSER (*Deutsches Archiv für klin. Med*, Band lxi. p. 221) has made an admirable investigation in this subject, both statistical—embracing, however, only French and German reports—and experimental. As the result of the first part of this study he comes to the following conclusions: Hereditary transmission of tuberculosis occurs in men and animals (cows, rabbits, and guinea-pigs) on the mother's side, and the transmission is undoubtedly through the fœtal circulation (eighteen positive cases in human beings are mentioned).

There is not a single instance of hereditary transmission by the father, although there is no doubt that in severe general tuberculosis bacilli are frequently present in the semen.

In almost all cases of hereditary transmission in men and animals the mother is severely, usually fatally, tuberculous. So, too, tubercle bacilli are found in semen only in cases of severe general tuberculosis or tuberculosis of the testes. Even in cases of severe general tuberculosis (not miliary) of the mother not more than 10 per cent. of the offspring have tuberculosis.

These conclusions give no support to the theory of bacillary heredity of tuberculosis, for the following reasons, among others: The fact that the mother only is concerned contrasts strongly with the common observation that the fathers of tuberculous patients are affected almost to the same extent as the mothers. In bacillary inheritance the liver is most frequently affected; the liver and portal lymphatics are, in fact, the organs chiefly affected in 80 per cent. of cases. Yet tuberculosis of the liver is relatively rare at all ages. All the positive observations show merely that tuberculosis acts as any other infectious disease, in which, in severe cases, the mother may transmit the germs to the fœtus. But because this can happen with staphylococci no one would claim that all cases of infection of that kind are inherited. The author explains the theory of Baumgarten from every point of view and with great skill, and that part of it which assumes that the occurrence of tuberculosis of the lymph-glands and joints cannot be explained by external infection is contrasted with the acceptance of still more intricate modes of infection by the Baumgarten school.

Hauser's experiments were made on rabbits and guinea-pigs and extended over four years. No example of undoubted congenital tuberculosis was observed, and there was no evidence that tuberculosis of the parents caused a

lessening of the "vital energy" of the descendants, even to the third generation.

The comparisons with syphilis and pebrine are instructive, but need not be given here. Hauser attributes the undeniable hereditary character of tuberculosis to infection due to unusual exposure to the virus and to an inherited predisposition to the tuberculous virus—an unsatisfactory but necessary explanation, which is illustrated by comparisons with premature baldness, dental caries, weakness of the respiratory and digestive organs, and idiosyncrasy to poisons.

Pneumothorax from Gas-forming Bacteria (B. coli).—MAY and GEBHARD (*Deutsches Archiv für klin. Med.*, Band lxiii. p. 323) have observed an example of this process. The subject was a laborer, aged forty-three years, who, after repeatedly stabbing another man, gave himself two wounds in the region of the heart. The wounds healed readily, but the temperature remained high, with evening exacerbations. Later, an effusion formed in the left pleural cavity. It was hemorrhagic and appeared to contain diplococci. Soon the symptoms of pneumothorax appeared, with succussion. The fluid then was hemorrhagic and purulent. On tapping the thorax gas was found, which burned with a pale-bluish flame. A costal resection was made. Still later, a pericardial exudate was discovered, reaching large size, and on opening the pericardium two litres of fluid were evacuated. Two months after the beginning the patient died. Autopsy revealed fibrino-purulent pleurisy and pericarditis, fatty and congested liver, beginning cyanotic induration of the kidneys, and general anasarca.

The discussion of the physical signs is interesting, as there was probably, at an early stage, pneumopericardium masked by the pneumothorax, but the most valuable part of the report is that regarding the formation of the gas. This was found to contain CO_2 and traces of hydrogen and nitrogen. The gas was evidently formed in the body by bacteria, and cultures and experiments proved these to be colon bacilli, which were found in the pleural cavity and pericardium, along with the staphylococcus pyogenes aureus. The course of events was probably as follows: Infection with both organisms simultaneously, hemorrhagic exudate changed to purulent under the influence of the staphylococci, gas-formation by the action of the bacillus coli on the exudate. The authors point out the proofs necessary to show that the gas in a case of pneumothorax is of bacterial origin, viz., that the gas contains substances not found in air, such as H, H_2S, or marsh gas, and bacteria capable of producing the gas.

Treatment of Aortic Aneurism by Injections of Gelatin.—The *Lancet* (October 22, 1898, p. 1092) refers to an important communication of M. LANCEREAUX to the Academy of Medicine on this method of treatment, which had yielded remarkable results in his hands. A solution of 2 grammes of gelatin to 100 grammes of normal salt solution is made, and of this 250 c.c. are injected into the subcutaneous cellular tissue of the thigh. The injection is repeated at varying intervals of from two to fifteen days. Generally speaking, ten, fifteen, or twenty injections are usually sufficient to effect a complete cure. Lancereaux's first case had an aortic aneurism

which projected anteriorly and ruptured beneath the skin. Subcutaneous injections of gelatin caused coagulation of the extravasated blood and eventually cure of the aneurism. In his second case there was an aortic aneurism which did not come to the surface. Gelatin injections caused the dilated superficial veins to diminish in volume and all pain to disappear. Lancereaux had treated many aortic aneurisms and one subclavian aneurism with similar results. Two cases with aortitis and dilated aorta had no amelioration of symptoms, and at autopsy there was no clotting of blood in the dilated portion of the artery. M. Huchard had used the method in a severe case and obtained a complete cure after twenty injections, the only inconvenience being that the injections were very painful. He had also employed it with success in a severe case of hæmoptysis in pulmonary tuberculosis. Certain precautions have to be observed in employing the method, as a case of Boisset died suddenly from embolism after an injection. The gelatin must never be injected in the neighborhood of the aneurismal sac nor into the aneurismal sac itself.

HUCHARD (*La Presse Médicale*, October 26, 1898, p. 117) reported before the Académie de Médecine an instance of death following this method of treatment.

The case occurred in the practice of M. Barth. The patient was a woman, aged forty-nine years, who had an aneurism of the ascending portion of the aortic arch. The treatment with iodides failing to give beneficial results, the gelatin injections were tried. They were given three times weekly, and produced a distinct febrile reaction, the temperature reaching 39° C. After five injections a distinct diminution in the pulsation was appreciable. After the sixth injection the temperature rose to 40° C. and a large local abscess developed.

Several days afterward the patient was suddenly seized with a feeling of distress and suffocation, which gradually increased, the case terminating fatally a few hours afterward.

The autopsy revealed an aneurism of the aortic arch. A clot had formed in the sac, reaching 4 cm. in thickness at certain points; it had extended into the large vessels of the neck, the left subclavian being free, however.

He refers to the possible danger in the use of these injections, in that the resulting blood coagulation may be too rapid and too extensive.

To lessen the likelihood of the production of fever and too rapid clotting, Huchard advises a 1 per cent. solution of gelatin in preference to the 2 per cent. solution in normal salt solution advised by Lancereaux.

At the meeting of the Academy of Medicine on October 31st, Laborde explained that the action of the gelatin is entirely mechanical, as small, insoluble particles are absorbed and, reaching the sac, play the rôle of foreign bodies. The risks in the method are by no means imaginary.

The Etiology of Pseudo-croup.—G. ZIMMERMANN (*Münch. med. Wochenschrift*, 1898, No. 29) holds that false croup is a symptom of adenoid vegetations in the pharynx. His attention was called to this by the examination of a patient, a girl of eighteen, in whom the symptoms disappeared on scraping out the growths. In sixteen other cases the suspicion was confirmed, although a careful examination was made in only eleven. Three

were examined within half to two hours after an attack. In eight cases the vegetations were the only abnormalities present. In two there was laryngitis, in one rhinitis. The author's explanation of the mechanism is that mucus passes down the larynx, especially during rest in bed, and then causes spasmodic adduction of the false vocal cords, as in pencilling the larynx. A cough, which has a barking character on account of the position of the false vocal cords, frees the opening, but only temporarily. When the cough stops the larynx is closed again, before a deep breath can be taken, and so the symptoms of asphyxia are produced, and it is only in consequence of relaxation of the false cords from CO_2 poisoning that the respiration again becomes free. The subchordal swelling noted by some authors, and assumed to be the cause of the paroxysm, is secondary to the changes described, and is ascribed by Zimmermann to *hyperæmia ex vacuo*. In all cases removal of the vegetations was followed by recovery.

Koplik's Early Diagnostic Sign of Measles.—SLAWYK (*Deutsche med. Wochenschrift*, 1898, No. 17) confirms the observation of Koplik, that early in measles peculiar spots appear on the mucous membrane of the lips and cheeks. He found them present in forty-five cases out of a total fifty-two examined. The spots vary from 0.2 to 0.6 mm. in size, are round, bluish-white, slightly raised, and have a reddish centre about the size of a linseed. (This description differs somewhat from Koplik's.) The number of spots usually varies from six to twenty on each side, but there may be hundreds of them. Occasionally they are unilateral and most abundant in the vicinity of the lower molars. Microscopically they are found to be composed of fatty degenerated buccal epithelium. They are found in no other disease, and as they appear on the first or second day of the prodromal symptoms they constitute a very important early sign.

A Case of Xerostomia, with a Table of Thirty-nine Recorded Cases and Remarks.—A. J. HALL (*The Quarterly Med. Journ.*, 1898, vol. vii. p. 26) reported a case of xerostomia, or chronic dry mouth, which gave the usual clinical history of the disease. In the first volume of the *Edinburgh Hospital Reports*, Prof. Fraser reported a case and gave a summary of the nineteen cases of which he was able to obtain records. Since that date Hall has collected twenty other cases from the literature, making a total of thirty-nine cases in all. In three of these cases Hall had not been able to obtain the details, so that the following statistics comprise only thirty-six cases.

Sex: 32 females, 4 males.

Age: Between twenty and thirty years, 3; between thirty and forty years, 5; between forty and fifty years, 8; over fifty years, 18; age not mentioned in 2.

Parts affected: Mouth and tongue, 36: nose also, 10; eyes also, 7.

State of the skin: Alluded to in only 8 cases. In 2 it was very dry, whilst in all the rest there was more or less marked sweating, and in 3 it was efficient and normal. The conclusion is that the skin is not markedly affected, as a rule.

Duration: It persists usually until the patient dies. In 3 instances death followed the onset of the dryness of the mouth comparatively soon.

Condition of the tongue: In practically all cases in which the condition of the tongue was described, it had been "absolutely dry, smooth, fissured and cracked." The fissures seemed, in most cases, to have been merely smooth epidermis comparable to the healed-over cracks of an old eczema rimosum of the hands.

State of the teeth: Alluded to in only 16 cases. In some of the cases there was a very distinct history of "crumbling away" of the teeth at the onset of the dry mouth.

Reaction of the mouth: Records in only 3 cases. In one it was acid, in a second acid or neutral, and in a third alkaline.

State of the salivary glands and ducts—parotids: In 8 cases the parotids were enlarged, either equally or unequally. In 3 they were described as tender and painful; in 4 they were not so; and in 1 the gland ulcerated through into the mouth. In five cases the enlargement varied from time to time; in one of these the enlargement was most marked at the menstrual period. With one exception the other neighboring salivary glands were not enlarged, although they, as well as the intrinsic glands of the tongue, must be functionally involved to produce the severe grade of dry-mouth.

Mode of onset and supposed cause: In 19 cases reference is made to this point. In 6 the onset was sudden. In 6 cases the cause was attributed to mental shock. It followed influenza or some febrile affection in 4 instances. In 24 cases the cause was "unknown."

The generally prevailing theory as to the cause of these cases is that they are due to defective nerve function, and many show well-marked concomitant symptoms of nervous disturbance. In some cases it seems to be a cessation of function comparable to that which occurs in the ovaries and mammæ, and in such cases would seem to be in no way detrimental to the general health.

PÆDIATRICS.

UNDER THE CHARGE OF

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The Frequency of Typhoid Fever in Infancy.—JOHN LOVETT MORSE and HARTLEY WALES THAYER (*Boston Medical and Surgical Journal*, January 12, 1899, p. 36) offer a new contribution to this of late frequently discussed question, availing themselves of the Widal serum reaction as a means of diagnosis. Fifty infants, under two years of age, who were brought to the out-patients' department of the Infants' Hospital, of Boston for diarrhœal diseases were subjected to the test. The day of the disease

upon which the blood was taken varied from the third to the fifty-sixth, the majority of the cases being between the fifth and twenty-first days.

In only one case was a positive reaction obtained, and this was in a baby of seven months, first seen on July 12th, the fourth day of illness. It had lost appetite, had abdominal pain, was vomiting frequently, and had six or eight large, watery, greenish, slightly foul movements daily, containing curds, but no mucus or blood. It had been fed at the breast for three months, and then on an uncooked mixture of cow's milk and water. Under treatment the vomiting soon ceased, and the stools were normal in every way on July 21st, the ninth day of treatment and thirteenth day of illness. At no time was there any abdominal tenderness or distention; there were no rose-spots and no splenic enlargement. The temperature ranged between 38° and 39° C. until July 19th, after which it remained normal. A positive serum reaction was obtained on July 12th in fifteen minutes, and another on July 16th in twenty minutes. The mother of this child had a "slow fever" ten years before, since which time she had been in good health. Her blood gave a positive reaction in fifteen minutes on July 16th during her baby's illness.

The question of a previous attack of typhoid fever in the mother was investigated in thirty-nine cases. Thirty-three had not had the disease, while six had had it some time in the past twenty-four, twenty, fifteen, ten, seven, and four years, respectively, the mother of the baby whose case is detailed above being of the number.

If it were not for the positive reaction of the mother's blood this case could only be considered as a case of infantile typhoid. The marked reaction in her, the authors think, suggests the possibility, if not the probability, that the agglutinative power of the serum of the child may have been due to the maternal blood or have been derived from the breast-milk. They conclude that typhoid fever, as is commonly believed, is an unusual disease in infancy; and advance the proposition that it is possible that women whose blood gives a positive reaction, even years after the occurrence of the disease, may in some way transmit this property to the blood of their infants.

Facial Paralysis of Central Origin Due to Faulty Application of the Forceps.—TISSIER (*Annales de Médecine et Chirurgie Infantiles*, September 15, 1898, p. 638) reported to the Société d'Obstétrique de Paris the observation of facial palsy in an infant whose head had been injured by three unsuccessful applications of the forceps. The child died, and the reporter was enabled to observe that the scalp had been infiltrated and the brain suffused with blood; but there was no hemorrhagic focus in the brain itself, nor crushing or depression of the skull. The facial nerve was dissected out, and at no point in its course was there hemorrhage or serious pressure. On the paralyzed side the imprint of the forceps was found, but well above the course of the nerve.

Tissier considers that the facial palsy in this case should be attributed to the more or less marked compression of the cranial vault—that is, to an action upon the nerve-centres. This theory, he thinks, explains the rarity of facial paralysis after skilful application of the forceps.

BUDIN, in discussing the case, questioned the rarity of facial palsy after

regular application of the forceps. He had seen it very frequently before the advent of Tarnier's forceps, as had CHARPENTIER, especially in the case of application of the forceps somewhat high up. According to Budin, the mechanism was always the same, the blade of the forceps slipping downward from the head, dragging upon the soft parts, and finally compressing the petrosa, the cutaneous cicatrix being found well below the ear.

A Pad on the Dorsum of the Foot in Rickets.—A. H. TUBBY (*Pediatrics*, January 1, 1899, p. 19) calls attention to the frequent occurrence of a pad-like formation upon the dorsum of the foot, and occasionally upon the hand, which he believes has not been previously described. In these cases the soft tissues upon the dorsum are decidedly thicker than in healthy children, and the swelling may be a flattened elevation or dome-like in appearance. Its color is that often seen in the skin elsewhere in rickets, and may be compared to that which would be produced by the injection of white wax, slightly tinted to a yellowish shade, beneath the skin, so as to give it a distinct tint and a semi-transparent look. While in a healthy child the skin of the dorsum of the foot, if pinched up between the fingers, can be moved independently of the subcutaneous tissue, in many rickety children the skin and subcutaneous tissue are quite inseparable, and only a more or less thick fold composed of both can be made. In many cases it appears as if solid œdema were present in the skin and subcutaneous tissue.

This pad in some cases originates in swelling and thickening in the neighborhood of the epiphyses of the metatarsal bones, hence it is more frequently seen rather toward the anterior than the posterior part of the dorsum. When the bones are so affected, distinct beading may be felt about the epiphyseal lines, and doubtless the perichondrium and periosteum are thickened as well. In early rickets the swelling is often semi-fluid. In cases of a few months' duration it is semi-solid, and in those of more than a year's duration it is hard and resistant.

The author has tabulated 100 cases of rickets, eighty-six of which had dorsal pads. He believes that if cases be watched over a long period of time the pad will be observed to go through the three stages of consistency noted above. At a period of eighteen to thirty-six months after the onset of the disease the subcutaneous pad disappears concurrently with the general flabbiness and undue pallor of the skin, and leaves the bony changes easily apparent to the touch.

The Specific Organism of Vaccinia.—A. F. STANLEY KENT (*Lancet*, December 17, 1898, p. 1616) publishes the results of further studies upon the organism discovered by him in the tissues of the vaccine vesicle in 1894. This was described as a bacillus, exceedingly minute, measuring a bare micron in length; it appeared to occur, as a rule, in pairs, joined so as to form dumb-bells, not true diplococci, the individuals being distinctly, though only slightly, greater in length than in breadth. The minute bacilli occurred not on the surface, or, as far as could be ascertained, among the crowds of foreign organisms in the most superficial parts of the vesicle, but deeply seated, in large numbers and in practically pure culture in their special habitat beneath the line of incision.

The author's later studies have been devoted to elaborating a method of preparing pure cultures of this organism, investigating its staining properties, and conducting inoculation experiments with the cultures. He has thus succeeded in proving that in the organism described as the diplobacillus vacciniæ is found a virus which occurs in the vesicles (and tissues surrounding them) of ordinary vaccinia, exhibiting special morphological characters and staining reactions, and having a special distribution in the tissues. Pure cultures of this organism, when used for inoculation of susceptible animals, give rise to vesicles which are described by experts as being indistinguishable from those produced by current vaccine lymph. Moreover, these animals have been found subsequently to give no reaction when revaccinated with active lymph. Finally, sections through the vesicles so produced are found to contain the organism in large numbers and exhibiting the same morphological characters, staining reaction, and distribution as the organisms originally found in the vesicles of typical vaccinia.

Treatment of Tuberculous Cystitis in Children.—In a thoughtful paper upon "Tuberculous Cystitis in Children," CHARLES GREENE CUMSTON (*Boston Medical and Surgical Journal*, December 22, 1898, p. 619) gives the following outline of treatment. Cod-liver oil, creosote, and tonics are of value, and iodoform in the form of a pill is highly recommended by Guyon and Reverdin. Locally an iodoform or guaiacol emulsion is to be injected into the bladder and retained until expelled. The ulcerations may be cauterized and curetted if they be extensive. Being aware of the favorable results obtained from local applications of lactic acid in tuberculous laryngitis, the author was led to try this agent in the bladder, and the results obtained in the case reported in this paper would appear to indicate that further use of this substance is justifiable.

The indications for suprapubic cystotomy vary according to the end to be obtained. If it is done to bring about a radical cure it should be performed only in cases of primary vesical tuberculosis, and then much can be expected from drainage of the bladder. The ulcerations can be directly cauterized with the thermo-cautery or even excised through the opening. When this operation is done as a palliative measure—that is, when other foci of the disease are present and the cystitis is secondary—the relief from pain is quite enough to justify its performance.

Movable Kidney in Children.—JULES COMBY (*Pediatrics*, November 15, 1898, p. 439) reported to the British Medical Association, at its meeting in July last, that he had encountered eighteen cases of this condition in children in the course of the past several years—so relatively high a number that he is convinced that the condition is common at all ages. Of the eighteen cases two were aged respectively one month and three months; six were between one and ten years; and ten were above ten years of age. These figures, however, corresponded only to the dates of examination and diagnosis, so that the mobility doubtless dated back further than this. Sixteen of the cases were girls, two were boys—the same proportion of the condition in the female sex observed in adult life. In fourteen of the cases the mobility was associated with dyspepsia and dilatation of the stomach;

hereditary syphilis was obvious in two cases; chlorosis in two; lienteric diarrhœa in one; migraine in one, and psoriasis in one. In nearly every case the affection was latent; in two it had been mistaken for a chronic appendicitis; twice it had been recognized and treated. As regards the cause, it was impossible to attribute it to pressure of the corset, as the greater number of the patients wore neither corset nor belt. Nearly all were dyspeptic, having gastric troubles or pains in the stomach, suffering, perhaps, as a result of gastro-intestinal distention, to which ill-nourished children are subject. But in the two subjects of hereditary syphilis, in whom the floating kidney was discovered post mortem, none of the above causes could have been operative, and the affection must here be considered as congenital. Litten, Gutterbock, Ewald, and Albarran believe all cases to be of congenital origin, with which opinion the author seems inclined to agree, at least to the extent of supposing the kidney to be provided with too long a pedicle, which causes it to float in the abdomen either spontaneously or as the result of pressure or injury. The greater liability of females than males to this displacement he thinks must have some connection with the abdominal conformation of the former.

The symptoms are very variable, and do not at any time afford a satisfactory guide to diagnosis; often the affection is absolutely latent. Pain, at times paroxysmal, is sometimes present, and may come on after some unusual fatigue or effort. In these somewhat rare cases the kidney may become twisted and the ureter occluded, causing hydronephrosis, which may be transitory, intermittent, or persistent. Coprostasis, appendicitis, different cystic or solid tumors of the kidney, perinephritis, and stone are among the conditions to be excluded. Palpation usually reveals the presence of a smooth, rounded, movable mass. When the affection is latent or well borne, when the pains are moderate or intermittent in character, rest and an abdominal belt may suffice to relieve. Bandaging rarely succeeds. Dyspepsia and constipation, which are so often present, should not be neglected. Should the pains persist or become unbearable, or attacks of peritonitis or hydronephrosis occur, the operation of nephrorrhaphy should at once be made.

Sarcoma of the Intestine in the Child.—ABLON has collected in his thesis (*Des Fibromes Embryonnaires (Sarcomes) de l'Intestin chez l'Enfant*, Paris, 1898) ten observations of intestinal sarcoma in childhood, all of which were of the round-celled variety. The disease occurs at all periods of childhood, and may not infrequently be of congenital origin. Its evolution is extraordinarily rapid, terminating fatally usually within two months after its apparent beginning. Heredity was noted in none of the cases, but direct traumatism was mentioned in two instances. The existence of metastatic foci in the viscera has been noted in three-fifths of the cases—in the liver and then in the kidneys most frequently. The development of glandular metastases in regions more or less distant from the primary focus has been noted in equal frequency with the visceral metastasis, but in only one case was there a generalized involvement of the lymphatic glands.

Pathogenesis of Furunculosis in Nurslings.—FRIEDJUNG (*Archiv f. Kinderheilkunde*, 1898, Band xxiv. S. 375) has examined bacteriologically nine

cases of furunculosis in nurslings, which presented themselves under three varieties: 1. Subepidermic abscess. 2. Furuncles, properly so called. 3. Abscess of the subcutaneous tissue developing almost without inflammatory reaction. In these nine cases, from which fourteen cultures of pus were made, the author found the staphylococcus aureus ten times, three times the same organism associated with a small number of staphylococci albi, and once the latter organism alone. He therefore concludes that the furunculosis of nurslings is a staphylococcic infection of the skin.

As to clinical varieties, he states that in each case in which there was subepidermic abscess there had previously existed a superficial lesion of the skin (varicella, miliaria, eczema, syphilides). On the other hand, previous lesion of the skin was absent in all the cases in which there was furuncle, properly so called, or abscesses developing without reaction.

SURGERY.

UNDER THE CHARGE OF

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Asepsis in Operations.—In discussing the work of Mikulicz in perfecting aseptic technique in operating, QUENU (*Revue de Chir.*, March 10, 1898) says that asepsis is not to be abandoned and a return made to antisepsis, but that the defects in aseptic operating must be discovered and means found for overcoming them.

The employment of gloves in operating produced such marvellous improvement in Mikulicz's results as to render his technique almost perfect.

Quenu has found that ordinary white cotton gloves, such as worn by servants, when sterilized in the usual manner serve all the desired ends. They are not impermeable, and the hands should be rendered as aseptic as possible by the ordinary scrubbing, alcohol, and antiseptic washings. In a short operation one pair of gloves is enough, but if the operation is longer they become soaked through, and one or two changes are necessary. They do not interfere with the ordinary manipulations in operating, and their ready employment is only a matter of habit. The employment of sterilized gauze before the mouth to prevent infection from coughing and speaking is favored by this author.

In his service for the past six years he has never examined a suppurating case the morning before an operation of grave character, such as a laparotomy. His wards are divided for suppurating and non-suppurating cases, and all suppurating cases are operated upon by his assistants. Of course, he is

obliged to make rectal and vaginal examinations, but these are never made on a morning preceding a grave operation. Immediately after such examinations the hands are thoroughly scrubbed with soap and water, washed in alcohol, then in permanganate of potassium, followed by bisulphite of soda, and, finally, in alcohol again.

The greatest care is given to the periungual spaces. After thorough sterilization they are painted with tincture of iodine. He agrees with Mikulicz in admitting as few as possible into the operating-room, and does not perform major operations in a large amphitheatre. He also believes that speaking should be avoided as far as is practical during the operation.

The Value of the Laborde Method of Resuscitation in Etherization.—HERZOG (*Deut. Zeitschr. für Chir.*, Bd. xlvii. p. 492), after a series of experiments upon dogs which had been anæsthetized to the point at which respiration ceased, shows that the Laborde method of resuscitation by rhythmical traction upon the tongue is of no value except in the early stages of the anæsthesia.

Hæmostasis Secured by Angiotripsy.—The success reported by Tuffier, which followed his crushing of the lateral ligaments in vaginal hysterectomy, and the use of this method without ligatures or hæmostatic forceps on the arteries, induced AF SCHULTEN, of Helsingfors (*Centralblatt für Chir.*, 1898, No. 29), to attempt the employment of this method upon the lesser vessels in general surgical operations. He found that by using a forceps with stronger jaws than the Péan hæmostat, and longer handles for leverage, he could readily crush arteries that had been picked up, so that ligation was not necessary. The result upon the healing process was all that could be desired. The absence of ligatures decreased irritation; there was no secondary hemorrhage, and primary union followed in all cases except one, in which an intercurrent pneumonia caused the wound to open and heal by granulation. In this case, although no ligatures had been applied, no hemorrhage occurred.

Operation in Lymphadenitis.—VANDERLINDEN (*Annales de la Soc. Belge de Chir.*, August 15, 1898) calls attention to the physiological function of the lymphatic glands, pointing out the fact that they destroy the germs and poisons that enter the system and act as a barrier to their generalization. The question of operative interference is therefore one that involves a judgment of the rôle which they are acting at the time. If they are preventing the dissemination of the poison they should be left and aided in their work by the removal of the original focus of infection. If their vitality and resisting power has, on the other hand, been destroyed so that they act as a nidus for the further development of bacteria, they should be removed. Of course, this reasoning does not apply to cases of malignant infection, in which the infection is a sufficient indication for removal. There are also many circumstances which must enter into the consideration in individual instances. The author cites instances in which the removal of glands undoubtedly led to a rapid dissemination of tubercular disease throughout the system.

The Filling of Cranial Osseous Defects with Charred Bone-plates.—GREKOFF (*Centralblatt für Chir.*, October 1, 1898) has employed in actual practice the method which Barth found valuable in experiments. In the cases of two young children who had, as the result of operation after serious injury, defects in the cranial bones, he used the charred bone with success. In one instance all the plates were not sufficiently charred, and he was obliged to remove some fragments. This gave him the opportunity to observe the actual condition in the remaining plates. He found that the results were all that could be desired, and that the charred plates had been replaced by new, healthy bone.

The function of the charred bone, the author believes, is solely that of a skeleton over which the new bone develops from the adjacent margins of the skull. The cancellated bone is, therefore, most readily penetrated and absorbed, and makes the best plates. In his cases he employed the scapulæ of the calf.

Bier's New Osteoplastic Amputation.—PAYR (*Centralblatt für Chir.*, 1898, No. 19) reports three cases in which this new osteoplastic method of amputation was employed with success, as demonstrated by a skiagraph taken a year after the operation.

The purpose of the method is to unite the extremities of the tibia and fibula by an osteoperiosteal flap, which is derived from the tibia in the following manner:

A musculo-cutaneous flap is formed from either the anterior and external or the anterior and internal aspect of the leg in the ordinary manner. The tibia is freed to a considerable distance below the point at which it is desired to amputate. A transverse incision is then made at a distance below the line of amputation equal to the length of the desired bone-flap. This incision forms the base of a wedge-shaped portion of the tibia, that after removal permits the insertion of a flat saw-blade and the cutting of the osteo-periosteal flap up to the line of amputation. The periosteum is now raised over the line of amputation at the base of the osteoperiosteal flap. A grooved director is passed beneath the periosteum, and with a narrow saw the portion of the bone-flap is removed, which will permit it to bend over without interfering with the circulation on which it depends for its nutrition. When this has been accomplished the flap of bone is turned back and the tibia cut through. The fibula is cut at the same level, and the osteoperiosteal flap is fastened upon the resected ends of the two bones. The wound is closed in the usual manner. Asepsis or the use of only non-irritating antiseptics is essential to the success of this operation. The Röntgen ray picture showed that the osteoperiosteal flap had retained its original thickness throughout, and that it was firmly united to both the tibia and fibula. The functional result attained was all that could be desired.

The Diagnosis of Nephrolithiasis by Röntgen Ray Pictures.—RINGEL (*Centralblatt für Chir.*, December 10, 1898) has followed out the experiments of some of the earlier investigators and has found that the different forms of renal calculi vary in their opacity to the Röntgen rays.

Oxalic-acid calculi are the most opaque, uric-acid calculi are less opaque,

while the quality of Röntgen ray he employed readily penetrated the phosphatic calculi and biliary calculi.

Repeating the experiments on the cadaver, his results conincided with those of the earlier observers. The more opaque calculi could be shown, but the less opaque were readily penetrated and could not be detected.

His conclusions are the same as those of the earlier observers, that the positive diagnosis is the only one that can be relied upon, as certain calculi may be present, but cannot be detected.

[This author probably employed a "hard" tube, and in consequence penetrated the less opaque calculi. Clinical experience has recently demonstrated that an absolute diagnosis, both positive and negative, can be made. Sufficient Röntgen discharge can be developed in a "soft" tube of the latest design to penetrate the lumbar region, and yet the quality of the light is such that it will differentiate between the lesser densities, and show all forms of calculi in contrast to the surrounding structures.]

Coxa-vara.—In reporting a case BRUN (*Revue d'Orthopédie*, November, 1898) says that coxa-vara is revealed by defects in the manner of walking. The child stumbles at every step, especially if he is permitted to walk alone. By careful concentration of the mind upon the walking he is able to correct the defects. The walk is like that of double congenital luxation. The case reported was mistaken for this. The author could not, however, locate the heads of the femora, and in order to be more certain had a radiograph taken. The diagnosis was thus cleared up. The fact which the author would call particularly to notice is that the radiograph has given positive knowledge of the existence of this deformity.

KIRMISSON (*Ibid.*), in discussing the same subject, says that a series of carefully studied and reported cases in which radiographs are employed are essential before the origin of this deformity can be definitely determined. There can be no doubt that there are various causes for it, but the only way to determine what they are is the collection of a large number of cases.

To the causes already enumerated he would add fracture of the neck of the femur, which he believes is less infrequent than has been supposed. It is not possible to make the diagnosis of coxa-vara without the employment of radiographs, no matter what the clinical conditions are that are present in the case.

In making a résumé of his work upon this subject, FABRIKANTE (*Revue de Chir.*, November 10, 1898) says:

1. The affection commonly called coxa-vara is most frequently of rhachitic origin, and is characterized by an incurvation of the neck of the femur.

2. This incurvation may consist (*a*) in a deviation of the neck of the femur downward, with the angle between the neck and the shaft of the femur diminished; (*b*) deviation in advance or backward, with a coincident curve in its longitudinal axis.

3. The greater the curve the less result can be hoped for from orthopedic treatment.

4. In cases requiring operative treatment the preferable thing to do is to remove a wedge-shaped piece from the neck of the femur; its base should be upward.

5. In cases admitting of orthopedic treatment the best method is to employ massage and extension by very small weights, in order to avoid spasms in the muscles.

6. The extension should be employed only during the night. This is not fatiguing for the patient, and does not prevent his getting about during the day.

7. The high shoe is useful only in chronic cases, but it should not be forgotten in treating these cases.

8. The treatment other than local should be carefully directed toward counteracting the rhachitic tendency.

The Importance of the Radiograph in the Diagnosis and Treatment of the Deviations of the Spinal Column.—REDARD and LARAU (*Revue de Chir.*, November, 1898, Supplement) reported to the French Surgical Congress their results in the diagnosis of different forms of deviation of the spinal column by means of skiagraphs. They have found this method of diagnosis very valuable.

In Pott's disease they have demonstrated the foci of disease both in antero-posterior and lateral views. The initial lesions are detected in this manner. In many of their cases this was accomplished very early, and this early diagnosis made it possible to institute treatment at a period before the subjective and objective symptoms were sufficiently marked to make the diagnosis possible by other means.

The radiograph shows how many vertebræ are affected and to what extent. It also shows the extent of the lesions, the loss of substance, the existence of sequestra and tubercular cavities, the degree and cause of the reflection of the thorax. In cases in which the abscess had been treated by iodoform injections the size of the abscess and its shape could be clearly shown.

Radiographs taken at different periods mark the progress or regression of the disease. The results of treatment and the necessity of further interference are clearly demonstrated.

In many instances in which the deformity had been corrected it was seen that the bones had been united in a good position. The union by interfragmentary or peripheral callus of one or more vertebræ was often visible in the negatives. The radiographs have demonstrated, as have anatomical specimens, that in many recent cases a complete cure can be effected.

In cases of scoliosis the deformities can be studied with benefit in this manner. The position and amount of deformity of the individual vertebræ can be carefully noted. The asymmetry or deformities of the vertebral arches can be studied. The callus uniting several vertebræ can be seen in many cases, while the exact details make it possible to determine the cause of the curvature and make a certain prognosis.

Not only is the shape of the individual vertebræ readily studied, but the internal structure of the vertebræ, the striation of the osseous tissue, the condition of the epiphyseal cartilages, etc., are shown.

Hydatid Cysts of the Kidney.—HOUZEL (*Revue de Chir.*, September 10, 1898) says of the diagnosis of this disease of the kidney that it can be made only by exclusion, and that we must search among the subjective and objective symptoms for those that are convincing.

A tumor that develops gradually, which the patient has perceived only by chance, the evolution of which has been without fever or pain, and has had no general effect upon the system and shows its presence only by symptoms of compression, should always bring to our consideration a hydatid cyst of the kidney. Engagement in occupations such as caring for kennels should strengthen the suspicion, although it is not essential that the patient's occupation should be of this character. The absolute determination is dependent upon the perception of a hydatid vibration, although this has been observed in only two cases out of twenty-eight collected.

The tumor itself is globular, elastic, fluctuating, painless, situated in one of the lumbar regions, forming a certain prominence and having a limited amount of mobility, which may even be entirely wanting. The slowness of the development and its indolence make it possible to exclude cancer and to make the diagnosis of a cyst; but there is no precise clue as to its nature and location. In general the diagnosis is based upon the following points:

The gradual and silent evolution of the tumor, the occupation and habits of the patient, the absence of pain and fever (suppurating cysts of course being excluded), the absence of urinary troubles, the globular form of the cyst, the fluctuation, the hydatid vibration, the immobility in connection with the respiratory movements, the limited general mobility.

The kidney can sometimes be detected beside the cyst, and the position of the tumor at one side of the abdomen, in the lumbar region, extending beneath the ribs and making a prominence in the lumbar region, indicates that the kidney is the organ involved.

The discharge of hydatid vesicles by the mouth or anus, and especially in the urine, this taking place during an attack of nephritic colic and being coincident with a diminution of the renal tumor, is pathognomonic.

Spontaneous recovery from this condition is not to be counted upon. It is so rare and is accompanied by such grave chances that intervention as early in the disease as possible is always indicated. Rupture or suppuration are both dangerous, while the retention of the parasite or the rupture of its sac leads to far more serious complications than those which accompany its course of development. No matter how gradually the cyst develops it always has a fatal termination, either from the excess of its development, from its rupture, from its suppuration, or from its influence in a mechanical way upon the nutrition, the respiration, or the circulation.

There are two methods of curing these cysts—nephrectomy and nephrotomy.

Nephrectomy is an exceptional operation, which should be undertaken only in rare instances and under exceptional circumstances.

Lumbar nephrotomy is the preferable operation and the one which should be employed in the majority of these cases.

Suprapubic Transplantation of the Penis.—WAGNER (*Centralblatt für Chir.*, July 30, 1898) reports a case in which, as the result of trauma, so great a defect ensued in the posterior portion of the urethra that it was impossible to close it by the usual methods. There had been great loss of tissue, with a recto-vesical fistula as well as a perineal one, and the rectum had been so injured that it became necessary to do a formal resection of the lower portion for the resulting stricture.

The extensive scar-tissue which resulted from these conditions made it impossible to obtain normal skin for a plastic operation. Mikulicz, who was the operator, therefore determined upon a new and radical measure. An incision was made from above the symphysis pubis down upon the dorsum of the penis, and reached the bone. The ligaments supporting the penis were detached, and with them the entire penis without injury to it. The peritoneum was displaced upward and the bladder-wall exposed. A deep groove was cut in the symphysis pubis, which permitted the penis to lie in it. The urethra was then united to the bladder above the symphysis, and a catheter passed through into the bladder, where is was permitted to remain. The case followed a very satisfactory course. The union of the penis to the bladder was uncomplicated, while the urethra was kept dilated by the judicious employment of gradual dilatation by sounds. The urine was passed by the catheter, and the patient at the time of the report was able to retain the urine for two hours and then pass it in a stream. Sounds, however, had to be used regularly to keep the urethra from contracting. The perineal fistula decreased in size, but urine would dribble through it if it was retained over two hours. The result attained was far preferable to any that could have been secured by other means, and is one that can be employed wherever there has been an extensive destruction of the prostatic and membranous portions of the urethra.

THERAPEUTICS.

UNDER THE CHARGE OF

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Treatment of Insomnia.—Dr. Robert T. Edes believes that a normal and sufficient general nutrition is to be looked for as the basis for normal cerebral nutrition, but this does not necessarily imply the stuffing process. A useful criterion is the body-weight in reference to the height and usual or normal condition of the individual, and diet is to be regulated upon this basis. Secondly, the distribution of the blood is to be equalized, with the balance, however, tending to anæmia of the brain rather than the reverse, though by no means to an extreme. The derivation of blood may be accomplished by hot baths of the feet or of the lower half, or even the whole body, emphasized, if necessary, by a little mustard. The well-known expedient of a small amount of easily digestible food just on going to bed, or on waking up in the course of the night, probably acts, to a considerable extent, at least, in the same way. A hot toddy adds to a slight direct narcotic effect the early vasomotor dilating action of alcohol. Cold feet are often an accompaniment or partial cause of insomnia, and it is well to promote the circulation in them by a hot bath for five minutes, followed by a short, cold douche and friction, rather than simply to attempt to warm them by hot bottles.

Hypnotics may be roughly divided into two classes: (1) Those which diminish nervous irritability; and (2) those which distinctly, though perhaps not profoundly, narcotize the nervous centres. Of the first class the bromides —the potassium salt preferred—given in two or three doses during the latter part of the day, and in many chronic cases through the day, are valuable. If there is much nervous excitability and restlessness during the day, a bromization lasting a few days or a week or two is occasionally admissible. It is not believed that the hypnotic is yet discovered, or ever will be, which is at once trustworthy as producing the desired result and incapable of producing any unpleasant after-effects. Sulphonal comes as near to that standard as any drug, and used with care is little likely to do harm, except that which attaches to any habit of this kind or dependence upon artificial aids to sleep. The tardiness and permanency of its action cannot be looked upon as a disadvantage when properly allowed for. A second good night without renewal of the dose is not unusual. Fifteen grains are sufficient, and its use should not be prolonged beyond an emergency period of four or five days, without an interval of more than two days. Trional seems to enjoy most of the advantages of sulphonal, except that its effect does not last over two nights. Paraldehyde is a rapidly acting and sure narcotic, probably coming much closer to alcohol in its mode of action than the coal-tar preparations, but it may give rise to symptoms resembling mild delirium tremens, and it has a most disagreeable taste and smell, which may or may not be a disadvantage.—*Journal of the American Medical Association*, 1898, vol. xxxi. p. 757.

Septic Endocarditis.—Dr. Ludwig Herzog, from his observations of nine patients suffering from this disease, presents the following treatment: The important consideration is the strength of the patient, which must be increased by all means possible. Milk, eggs, port wine, brandy, and strong coffee suggest themselves. A water-bed is beneficial. The affected joints should be protected, kept at rest, and an ice-bag placed upon them; internally, sodium salicylate in solution should be administered. An ice-bag should be kept constantly upon the heart; in case of high fever, another upon the head. If a febrifuge is required, seven grains of quinine in powder or wafers are recommended. If severe diarrhœa supervenes, fifteen grains of bismuth subnitrate, or tannic acid, three grains, with one-tenth of a grain of opium, may be given every hour or two.—*Deutsche medicinische Wochenschrift*, 1898, No. 45, S. 716.

Saline Solutions in Medical Diseases.—Dr. Bolognesi concludes an elaborate paper by stating that the physiological saline solution is a valuable therapeutic agent. Its action upon vascular tension and in producing hæmostasis is well known. Numerous observations and experimental physiology have not yet given an explanation of its mode of action on intoxications and infections. This much we know: the injection, whether intravenous or subcutaneous, raises arterial tension, favors diuresis, diaphoresis, and the secretions in general. It does not produce, as has been claimed, a lavage of the blood, a disintoxication of the organism. Intravenous injections should be made only in case grave surgical or obstetrical hemorrhage has brought

about an acute anæmia sufficiently grave to produce speedy death; also in traumatic or operative shock. In the infections normal saline solutions may be employed hypodermatically or by rectal injections as soon as diminished vascular tension appears, the general condition is grave with enfeeblement of the organism, or in default of proper action of the emunctories. The quantity should be regulated carefully, and the action upon the heart and kidneys always kept in mind, lest, these being injured by the infection, the treatment may cause further damage. Those infections and toxæmias for which bleeding is applicable should be bled before resorting to this method. Aside from their stimulant and eliminant action, they nourish the patient and assist him as do no other excitants and stimulants ordinarily employed in the infections; but these solutions are not microbicides nor antitoxics.—*Bulletin Général de Thérapeutique*, 1898, T. cxxxvi. p. 778.

Gelatin Hæmostasis.—Dr. Paul Carnot reports upon its indications and contraindications. For local use the formula, gelatin, 5; calcium chloride, 1; water, 100, is useful. This may be sterilized by heat, but not at a temperature higher than 239° F., lest its solidification be interfered with. If the wound is septic, this treatment will suffice. The results are generally good. To increase the general coagulability of the blood, subcutaneous injections have been proposed. In practice these have been found to be dangerous. In ingestion of this preparation, or by hypodermatic injection of calcium chloride alone, we have a safe method which is equally useful in the treatment of hemorrhage at a distance or in certain hæmophilias.—*La Presse Médicale*, 1898, No. 94, p. 295.

Urotropin.—Dr. T. K. Holmes reports that a patient suffering from cystitis resulting from prostatic hypertrophy was not relieved by tying the vas deferens nor by washing the bladder with a boric-acid solution. Seven grains of this remedy, twice daily, reduced the urgency of urination, cleared the urine of pus, and enabled him to remain in bed at night, rising only once to micturate.—*Dominion Medical Monthly*, 1898, No. 5, p. 186.

[A more complete report by the editor, covering the use of this substance in cystitis due to prostatic hypertrophy, pyelitis, phosphaturia, and cystitis consecutive to gonorrhœal urethritis, is to be found in the *Medical News*, 1898, vol. lxxiii. p. 609. At present observations are being conducted to determine its value in tuberculous cystitis. Thus far they encourage the hope that a remedy of real worth has been found.—R. W. W.]

The Abuse of Ergot in the Treatment of Hemorrhage.—Dr. Frederick A. Packard presents a timely paper, which points out that in medical hemorrhage our object should be to endeavor to favor the formation of a clot in the ruptured vessel by measures that increase the coagulability of the blood, by calcium chloride, or, where possible, by local applications (such as the topical use of such remedies as hamamelis in epistaxis, the gentle inhalation of turpentine or other hæmostatic vapor in hæmoptysis, the administration of tannic acid in hæmatemesis, of lead acetate in hemorrhage from the bowels), to prevent mechanical disturbance of the clot by producing

local rest (opium to check cough and to stop peristalsis), and to lessen blood-pressure (as by restriction of ingestion of liquids, by the use of saline laxatives where permissible, by the hot-foot bath, by ligature of the extremities, by veratrum viride, nitroglycerin, or venesection, according to circumstances); but, above all, to avoid any cause for increase in blood-tension, and especially to abstain from the use of ergot, which is, of all drugs, the most active in lessening the capacity of the arterial tree.—*University Medical Magazine*, 1898, No. 3, p. 134.

[For hæmoptysis, calcium chloride and tincture of aconite, given alternately, are generally efficient. In general, for this purpose aconite should be substituted for veratrum, because it is equally effective, more easily managed, and far less irritating to the stomach.—R. W. W.]

Animal vs. Vegetable Ferments.—Dr. A. E. Austin has conducted laboratory experiments in order to determine the relative converting power of saliva, pancreatin, and taka-diastase upon starch. He finds that the last possesses a greater power in converting starches, in proportion to its weight, than does saliva or pancreatin. All these digestants are practically nullified in an acidity equivalent to that of gastric juice, so that practically no digestion can take place in the stomach from any of these. Further, these digestants are not destroyed by the acidity of the gastric juice, and there is no practical reason why their activity should not go on after they have passed into the intestines and alkalinity is re-established. Taka-diastase apparently carries the process of amylaceous digestion a step further than the other two, forming dextrose instead of maltose. In how far this is of value cannot be determined until more is known about the conditions attending the secretion of the succus entericus which contains the major part of the invertin and it is learned whether this substance is ever absent.—*Boston Medical and Surgical Journal*, 1898, vol. cxxxix. p. 567.

Apocynum Cannabinum (**"The Vegetable Trocar"**).—Dr. T. S. Dabney deplores the inaccuracy or absence of accounts in the various works on materia medica of Canadian hemp. After twenty years' use of the drug he finds that, contrary to the general teaching, it does not cause diaphoresis or expectoration. Emesis and catharsis follow only its improper use. It is its very great diuretic action that makes it invaluable. To apocynum he ascribes great invigorating power through increased keenness of appetite, while causing immediate resorption of albumin into the general system from the dropsical body-cavities. Under the exhibition of this drug one to two gallons of urine may be passed daily. Thus the surplus fluid is excreted by natural channels. The albumin lost is recovered by the blood, and the weakness following the customary paracentesis for ascites is avoided. The withdrawal of apocynum from general use the writer attributes to the close structural relationship between this drug and *apocynum androsemifolium*, which latter is wholly inert. Through conscious or unconscious substitution of this for Canadian hemp proper the great merits of the latter have been lost sight of. Thus the drug on the market is wholly unreliable, and so has fallen into disrepute. The writer, therefore, insists on using a pure preparation of the pure drug—either tincture, fluid extract, or infusion—in order to

gain results. He cites a number of instances of various forms of Bright's disease in which anasarca was completely done away with. The urine was regularly increased in amount. The number of casts and the quantity of albumin seemed regularly diminished, and general improvement speedily followed. Dropsy due to cirrhosis of the liver was also benefited. Hydrothorax and œdema of the legs caused by aneurisms of the ascending arch of the aorta entirely disappeared in two weeks. Anasarca complicating the various forms of organic heart-disease also improved greatly. He concludes by stating the physiological action of apocynum to be, clinically: To strengthen and tone up heart-action; to regulate markedly the irregular heart—not slowing the normal heart, nor increasing the blood-pressure, there being no contraction of the arteries. He compares it with strophanthus, but considers apocynum far more active. Its diuretic action is indirect and due to its "cardio-kinetic" effect, and not through stimulation of the renal epithelium. Decoctions of the drug cause mainly catharsis and emesis. Two alkaloids have been isolated—apocynin and apocynim. The advantages in recommending apocynum are: 1. Small amounts requisite for diuresis, emesis, or catharsis. 2. Pleasant taste. 3. Tonic properties, compensating for depression following free catharsis. 4. Harmlessness, an overdose being followed by emesis. Dose of the tincture is twenty drops, increased to thirty drops thrice daily. —*Therapeutic Gazette*, 1898, vol. xxii. p. 730.

Airol in Pellagrous Intestinal Diseases.—Dott. F. Cerato distinguishes three forms: (1) Chronic catarrhal enteritis; (2) dysenteric catarrh, and (3) serous catarrh. While calomel and opium in small doses may be of use in the second variety, they are useless in the third. Even in the second they present many disadvantages in the treatment of emaciated individuals and in those suffering from stomatitis, which so often is found in patients of this class. After experimenting with injections of tannic acid, rhatany by the mouth, colombo, bismuth, tannigen, and tannalbin, temporary improvement followed, but later the diarrhœa reappeared. In nine instances this remedy in from five- to eight-grain doses, frequently repeated, gave excellent results. In seeking an explanation, not only its astringent properties should be mentioned, but its iodine content appears to be responsible for the greater part of its good effects. Although it has been stated that iodine, even in small quantities continued over long periods of time, may produce a gastro-enteritis, this has not been found to be the case with this remedy.—*Gazetta degli Ospedali e delle Cliniche*, 1898, No. 142, p. 1502.

[Airol is chemically bismuth iodo-gallate.—R. W. W.]

Tannalbin in Infantile Therapeutics.—Dott. Olimpio Cozzolino administers this remedy internally in doses of from three to seven grains five or six times daily, either alone or combined with a hundredth part of calomel, in order to complete the disinfectant action of the former. Recently excellent results have been obtained by means of rectal injections of seven grains in two ounces of a 10 per cent. decoction of starch. Of forty instances of diarrhœa in children varying in age from two months to fourteen years cure resulted in all save two—one a child of seven years suffering from pulmonary tuberculosis, and a child of ten months with advanced atrophy. The

treatment is commenced with castor-oil, and later two injections each day are given, with possibly the addition of three drops of tincture of opium. Later iron and quinine may be useful to combat the anæmia.—*Gazetta degli Ospedali e delle Cliniche*, 1898, No. 136, p. 1447.

Treatment of Malignant Pustule.—Dott. Alfredo Gutierrez reports upon the use of the serum of sclavo in an instance of this disease. Bacteriological examination showed an abundant development of staphylococcus aureus with a few bacilli of anthrax, and these presented characteristic cultivations, and, injected into a guinea-pig, caused death. The pustule was situated over the right side of the jaw of a fourteen-months-old child. Two and one-half drachms of serum were injected in the left hypochondrium. Two hours later two drachms were injected into the right hypochondrium. Improvement in temperature and general condition, and rest followed. Nine hours later the first injection was repeated at the same place. The following day the child slept well, nursed greedily, and the temperature was still lower. The œdema and glandular swellings rapidly decreased, and three days later convalescence was established. Ten days later but the slightest evidence of the site of the pustule could be found. The severity of the disease in this instance and its tendency to extend in alarming proportions make noteworthy the rapid return to normal condition and the speedy subsidence of the œdema, which was brought about by only three injections. Commenting upon the reported case of Mendez and Lemos, this quotation from their paper is offered in conclusion: "The curative effect of the serum appears within four hours; the œdema begins to diminish and completely disappears in about twenty-four hours."—*Il Policlinico*, 1898, No. 20, p. 488.

Treatment of Chorea.—Dr. W. Essex Winter states that the first matter of importance consists in keeping the child in bed. This is necessitated by the tendency to endocarditis, and its value is emphasized by its beneficial effect in shortening the disease and bringing about a speedy cure in long-standing cases. The more useful drugs are antipyrine and arsenic—the first in early stages and in acute disease; the latter in later stages and chronic or recurrent cases. A disadvantage in the use of the first remedy is that when prolonged or administered in large doses it may bring out a pink, erythematous eruption, which may lead to the supposition that the child has measles, and sometimes give rise to interruptions in the treatment. The efficiency of treatment by arsenic is often marred by insufficiency of dose. In the majority of instances the dose of Fowler's solution must be increased to ten or fifteen drops in the course of ten days to a fortnight if the symptoms do not decline. Toleration is readily secured, provided that the drug is not given in too large a dose at first or the dose increased too rapidly, the medicine always being given, with sufficient dilution, immediately after food. In some cases arsenic may be pushed too far and produce a serious neuritis, but this is not likely to occur if the patient be kept in bed. In all cases a liberal diet is required, but stimulants are unnecessary. The principal complications are endocarditis and pericarditis, which in the acute stage are best treated by the salicylates. Rarely the movements are so violent and continuous as to bring about contusions and abrasions of the skin, with

exhaustion, and chloral and the bromides become necessary. The dose should be gradually increased until either the symptoms are subdued or physiological effects are produced.—*Treatment*, 1898, No. 17, p. 525.

DERMATOLOGY.

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INSTRUCTOR IN DERMATOLOGY IN THE UNIVERSITY OF PENNSYLVANIA.

The Histopathology of Psoriasis.—MUNRO (*Annales de Dermatologie et de Syphiligraphie*, 1898, No. 11), in order to eliminate all secondary changes, has studied the lesions of psoriasis in the earliest stages, and, as the result of the examination of 1500 sections taken from six untreated cases, he concludes that the disease is not due, as hitherto supposed, to some vice of formation of the corneous epidermis, the abnormal keratinization being an essentially secondary lesion. The primitive lesions of psoriasis are miliary abscesses of the epidermis, situated almost upon the surface of the corneous layer, and around these preformed abscesses the epidermic reaction produces a hyperkeratosis. Although long and carefully searched for no specific micro-organisms were found.

General Exfoliative Dermatitis (Pityriasis Rubra).—WALTER G. SMITH (*British Journal of Dermatology*, December, 1898), in a paper read at a meeting of the Dermatological Society of London, expresses himself as unable, from a general survey of the recorded cases of exfoliative dermatitis, to perceive any clearly defined species, but rather a continuous procession advancing from local forms to the most extensive, and from the less defined to the most characteristic manifestations of diffuse dermatitis. Exfoliative dermatitis may either arise primarily or be engrafted upon a polymorphous basis. No certain boundary line can be drawn between acute general eczema—possibly also psoriasis—and exfoliative dermatitis. It is a question of special vulnerability of the skin in certain individuals to acute, spreading "catarrhal" inflammation.

Leukoplakia Oris in Psoriasis and Other Dermatoses.—SCHÜTZ (*Archiv f. Dermatologie und Syphilis*, Band xlvi., Heft 3) has observed three cases of psoriasis in which there existed at the same time a marked leukoplakia oris. As he has seen a similar affection of the mucous membranes in other diseases of the skin, accompanied by an increase in cornification, such as tyloma palmarum and chronic scaly eczema of the elbows, he does not regard it as a real psoriasis of the mucous membrane. He concludes, however, that the coexist-

ence of leukoplakia and such affections of the skin as are associated with increased cornification is not purely accidental, but dependent upon a condition of the body common to both affections.

The Relationship of Darier's Disease to Ichthyosis.—E. DOCTOR (*Archiv f. Dermatologie und Syphilis*, Band xlvi., Heft 3) reports a clinical and microscopical study of two new cases of Darier's disease. He concludes that the differences between this affection and ichthyosis, while tolerably well marked, are not sufficient to justify the setting up of a new type of disease. Darier's disease is a hyperkeratosis connected with the hair follicles or the excretory ducts of the sweat glands, but occurring also independently of these. It is usually, but not always, associated with parakeratosis. The so-called Darier corpuscles are a part of the phenomena of parakeratosis, but do not necessarily belong to the disease picture, other forms of cell-degeneration being much more apt to occur. Darier's disease is a variety of ichthyosis, differing from this latter clinically chiefly through its localization and the presence of the Darier nodules, microscopically, by the proliferation of the papillæ and the rete mucosum.

A Case of Pemphigus Foliaceus with Osteomalacia.—HALLOPEAU and COSTENSEAU (*Annales de Dermatologie et de Syphiligraphie*, 1898, No. 11), at a séance of the Société Française de Dermatologie et de Syphiligraphie, presented a woman, forty-six years old, in whom osteomalacia appeared eight years after the beginning of a typical pemphigus foliaceus. The exhibitors were of the opinion that the coexistence of these two affections was not simply a coincidence, but was probably due to the resorption of the collagenous substance of the bones under the influence of the profound disturbance which the constant loss of organic materials by the surface of the skin brings about in the blood, setting free the phosphates which are normally combined with them.

Acne Varioliformis Capillitii.—POPPER (*Archiv f. Dermatologie und Syphilis*, Band xlvi., Heft 2), at a session of the Hungarian Dermatological Society, reported the following case: A man, thirty years old, had suffered for two years from a painful affection of the scalp. Upon inspection, flat, lentil-sized, bluish-red, painful nodules were to be seen scattered over the whole scalp, and between these were small pustules and flat, umbilicated crusts. Very large comedones were also present. After healing of the affected places, deeply situated, unsightly scars remained. The contents of the pustules were frequently examined for micro-organisms, but always with negative results. Treatment consisted in washings with spiritus saponis kalinus and applications of a white precipitate ointment. Improvement appeared after ten to fifteen days.

The Transmissibility of Alopecia Areata.—PLONSKI (*Dermatologische Zeitschrift*, Band v., Heft 3) reports two observations in support of the theory of the contagiousness of alopecia areata. A nine-year-old boy had had a continually increasing fall of hair for six months. Over the vertex were numerous round, coin-sized, hairless areas. On the occiput was a large, irregularly

shaped, bald area, which had evidently been formed by the coalescence of several smaller round ones. The skin was of normal color, free from swelling, smooth, and without scales. Three weeks later a six-year-old sister presented a round, coin-sized, smooth, bald area upon the vertex. The second observation concerned two sisters, the one ten, the other six years old, both of whom presented patches of alopecia areata, in the first instance having lasted one year, in the second, six months.

Atrophying Hyperkeratosis.—DUCREY and RESPIGHI (*Annales de Dermatologie et de Syphiligrophie*, 1898, Nos. 7, 8, 9) have made a new and extensive clinical and histological study of the affection described by Mibelli under the name porokeratosis, and their conclusions concerning this singular disease are as follows: Beside its cutaneous manifestations it may present manifestations upon the buccal mucous membranes, reproducing exactly the types of those upon the skin. By reason of its special and constant characters, clinical as well as anatomical, it should be considered as a particular morbid entity. One cannot confound it with the lichen of Wilson, which seems to be the dermatosis to which it is most nearly related, and it cannot in any manner be ranged in the group of ichthyoses The designation which best sums up the principal characteristics of the dermatosis, at least from the clinical point of view, is figurate centrifugal atrophying hyperkeratosis.

Polymorphous Tuberculosis of the Skin.—BROUSSE and ARDIN-DELTEIL (*La Presse Méd*, 1898, No. 32) report the case of a girl, sixteen years of age, chloroanæmic and scrofulous from infancy, who developed various cutaneous lesions after a disease of the bone occurring upon the right big toe at the age of four years. These lesions were a *tuberculosis verrucosa* of the right foot and leg with elephantiasis, a *scrofulo-tuberculous gumma* of the left side of the face, and a patch of true *tuberculous lupus* on the left cheek. Great improvement resulted from curetting and ignipuncture of the leg, followed by moist antiseptic dressings and the application of chlorophenol to the patch of lupus and the gumma.

Maragliano's Serum in the Treatment of Cutaneous Tuberculosis.—FILETI and LA MENSA (*Giornale Ital. delle Mal. ven. e della Pelle Fasc.*, 1897, i.) treated ten cases of lupus and scrofuloderma with Maragliano's antitubercular serum, using it both subcutaneously and locally. In a case of lupus of the hand occurring in a child, aged nine years, a cure resulted in forty-six days, six injections of the serum having been made in that period, besides using it locally. As no good result appeared, however, in any of the other cases treated by this method, the apparent benefit in this one case was probably only a coincidence.

The Frequency of Verrucose Tuberculosis of the Back of the Hand in the Course of Pulmonary Tuberculosis.—BÉCLÈRE (*Annales de Derm. et de Syph.*, 1898, Nos. 8, 9), at a séance of the Société Médicale des Hôpitaux de Paris, reported four observations showing that verrucose tuberculosis is, of all the forms of cutaneous tuberculosis, the one most frequently seen in pulmonary phthisis. It is seen almost always upon the backs of the hands

and fingers, by preference upon the thumb and index-finger. This is due, as Vidal has already pointed out, to the fact that the patient, after having coughed, wipes off the lips and moustache with the back of the hands. Proof of the correctness of this assumption is furnished by the fact that this form of cutaneous tuberculosis is exceptional in women. It results from a direct auto-inoculation, favored by abrasions of the skin in this region.

Cicatrization of an Ulcerating Epithelioma of the Face by a New Method of Applying Arsenious Acid (Czerny's Method).—HERMET (*Jour. Cut. and Gen.-urin. Dis.*, November, 1898, from *Annales de Derm. et de Syph.*, 1898, p. 226) cites the case of a physician, aged seventy years, upon whom this treatment was successfully used. The ulcer was cleaned and moistened with the following solution: Arsenious acid, 1; ethyl-alcohol and distilled water, āā 75. The water and alcohol must be evaporated in order that the arsenious acid alone remains in contact with the ulcerated surface. This is the secret of success. The first application is painful, but the pain usually passes away during the process of evaporation. Sometimes severe pain is felt for six or seven hours afterwards.

The best means of allaying the pain is to send the subject into the open air. Morphine is seldom needed. No dressing is required. Immediately after the fixation of the arsenious acid, a profuse serous-bloody liquid begins to ooze. During the night a reddish-brown crust is formed, which is to be removed on the following day. The open surface is then moistened with the same solution, while the crusted area is soaked with a solution of 1 : 100 to 1 : 50. The arsenious acid, penetrating the crusts, destroys the neoplastic tissue beneath. The application must be continued until enucleation on the borders begins. When the crust disappears and the ulcer looks healthy, the wound is treated as a simple sore. Three months' treatment was required to effect a cure in the case reported. [The treatment would seem to be adapted especially to the mild forms of the disease.]

A case in which the lower lip was successfully treated is reported by E. JEANDRAU (*La Presse Méd.*, 1898, No. 73). Here the application according to Czerny's method for two months resulted in complete disappearance of the tumor, there being no recurrence a year later.

A Liquid Soap; a New Base for Remedies; New Wool-fat Preparations.—HERBERT SKINNER (*British Journal of Dermatology*, October, 1898), under the caption of "Pharmaceutical Notes," gives some new formulæ which have been found useful in cutaneous diseases. A liquid soap, highly esteemed, is made of oleic acid, 2 ounces; alcohol (90 per cent.), 3 ounces; solution of ammonia, a sufficiency; water to 6 ounces. This may be perfumed with vanilla to disguise the odor of the oleate. The ammonia is added drop by drop until, after vigorous shaking, the odor can be barely detected. It is then allowed to stand for seven days and filtered through kaolin. Its cleansing properties are far above those of ordinary soap, and the alkalinity is scarcely noticeable.

A base containing wool-fat and lanolin soap, which can be used as an ointment or as a vehicle for the application of certain drugs, is made of lanolin soap, ½ ounce; distilled water, 2 ounces; anhydrous wool-fat, ½ ounce.

The soap is liquefied in the water, and the melted wool-fat added, the whole being transferred to a mortar and vigorously triturated in order to produce a homogeneous paste. The consistency is that of resin ointment; it should be preserved in air-tight jars or made fresh. Any medicaments save acids may be added.

An excellent base for cutaneous remedies consists of the yolk of one egg; lanolin, ½ ounce; rose-water, ½ ounce. Triturate together the lanolin and yolk of egg, then gradually add the rose-water. Used alone, it has a very penetrating and softening effect, far more so than wool-fat alone possesses. In order to form a cream, milk may replace the rose-water, and an antiseptic may be added to preserve the preparation.

Another wool-fat preparation may be made of wool-fat, ½ ounce; glycerin of starch, ½ ounce; white vaseline, 1 drachm. This is readily absorbed by the skin and forms a suitable base for formaldehyde even up to 10 per cent., and no changes occur even after keeping it six months.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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Protargol for Conjunctivitis.—PROF. PFLÜGER (Berne) tried protargol on one eye of an infant suffering from purulent conjunctivitis of the new-born, and on the other eye a warm solution of potassium permanganate. The first eye did not improve, the second did improve. He, therefore, discarded protargol except in connection with cauterizations by nitrate of silver. It caused no pain or irritation.

A. DARIER (Paris) points out that Pflüger used the drug in an utterly ineffective manner (some drops of a one-quarter of 1 per cent. solution morning and evening). He himself has employed a 10 per cent. solution four times a day, or cauterization with a stronger solution twice a day, and the instillation of a 5 per cent. solution between. He uses a 25 per cent. solution without untoward effects. He prefers it to silver nitrate in the treatment of purulent conjunctivitis, being safer and more effective, and much less irritant.

E. VALUDE (Paris) found protargol might advantageously replace silver nitrate in catarrhal conjunctivitis; but it seemed less reliable in purulent conjunctivitis.

M. DESPAGNET (Paris) agrees with Valude. He found the applications not painful, except in one case of trachoma in which it caused very great pain.

In four cases of vernal conjunctivitis protargol had effected a rapid cure.—*La Clinique Ophthalmologique*, July 10, 1898.

B. E. Fryer (Kansas City) finds a 2 per cent. solution of protargol preferable to the mercuric salts in the antiseptic preparation of the conjunctiva prior to cutting operations on the eyeball. It destroys the organisms and is not irritating.—*Transactions of the American Ophthalmological Society*, 1898.

[Silver nitrate is regarded as the specific remedy for purulent conjunctivitis, and other proposed remedies should be compared with it. But thorough cleansing of the conjunctiva is even more important, and if this be carefully attended to the substitution of even some inert substance for the silver nitrate might not be attended with any evil result.]

Sarcoma of the Orbit.—A. W. Stirling (Atlanta) reports a case of primary sarcoma of the orbit in a girl aged thirteen years. The protrusion of the eye had commenced three years previously, and recently she had suffered pains in and back of the eye. The eye still retained light perception; but it was removed with the whole contents of the orbit. Four days afterward the orbital walls were cauterized with chloride of zinc paste. No recurrence of the growth had shown itself after a year. A study of cases operated on at the Royal London Ophthalmic Hospital shows that the prognosis as to recurrence is not so good for primary sarcoma of the orbit as for primary sarcoma of the uveal tract. The growth recurred in nine out of sixteen cases after removal of the contents of the orbit. In ten cases of removal of the growth alone, without emptying the orbit, nine suffered a recurrence, and the tenth remained under observation for only eighteen months.—*Ophthalmic Record*, July, 1898.

Parinaud's Conjunctivitis.—H. Gifford (Omaha) reports five cases of this disease, which he prefers to call by the name of Parinaud, who first described it, in 1889, as an infectious conjunctivitis of animal origin. Gifford believes the grounds for thinking it of such origin are entirely insufficient. But it is evidently infectious, although apparently non-contagious. Bacteriological investigations have given no clue to the nature of the germ causing it.

The disease is characterized by sudden onset, great thickening of the lids, muco-purulent discharge rapidly becoming scanty, the formation of large and frequently polypoid granulations, with smaller granulations between them, and between or on the granulations occur erosions or small ulcerations. With the conjunctivitis, sometimes before it, there occurs sudden inflammation of lymph-glands on the affected side. Most frequently the pre-auricular or retro-maxillary glands are affected; but sometimes the cervical and submaxillary. This affection of the lymphatics is generally very marked, the swelling may be enormous, and suppuration may occur. Rigors and fever may mark the onset of the disease. But one eye is affected.

Left to itself the disease undergoes spontaneous cure in from two to six months. If the granulations are few and large the best plan is to clip them off and cauterize any ulcerations that may exist. The galvano-cautery, iodoform ointment, and astringent applications, as silver nitrate and copper sulphate, have been recommended. But if the granulations are numerous, the recovery will be slow under any treatment.

Retinitis Circinata.—E. AMMANN (Zürich) reports the first case of this disease in which the opportunity was presented for anatomical examination of the affected retina. The condition, first described by Fuchs in 1893, is characterized by a collection of white spots in the retina arranged in the form of a wreath. This wreath may extend around the macula, or encircle the disk, or be located elsewhere. The spots composing it may run together, forming a white plaque. Retinal hemorrhages occur, and the smaller retinal vessels may be markedly abnormal. The appearances suggest albuminuric retinitis; but the arrangement of the spots differs notably from the arrangement typical of that affection. The condition does not especially depend on syphilis, gout, albuminuria, or other recognized general disease; but albumin may be found in the urine.

Amman found that the retina presented great numbers of small hemorrhages that were not observed during life or macroscopically. The white spots clearly had their origin in hemorrhages, although they could not be seen to follow the hemorrhages directly, because in an intermediate hyaline stage they became invisible. The white spots were areas of fatty degeneration.—*Archives of Ophthalmology*, vol. xxvii., No. 2.

Glioma of the Retina.—C. D. MARSHALL (London) reports thirty-two cases which have been treated in the Royal London Ophthalmic Hospital since 1890. In five of these both eyes were removed for the growth. In 35 per cent. of the cases the tumor was detected during the first year of life; in over 80 per cent. it occurred before the child was three years old; in fifteen cases there was no recurrence, twelve of these having been seen after three years. He, however, reports one case in which, after removal of the eye, the child remained in good health for five years, and then suffered with what the surgeon in charge said was a recurrence of the growth in the brain.

In one case of undoubted glioma the tumor had undergone atrophy, with shrinking of the whole globe. He includes one instance in which three children of one family suffered from glioma, two of them dying of it. Such an occurrence is probably very rare, but should be borne in mind when the surgeon is asked about the possibility of the same disease affecting other children of the same parents.

In any case the prognosis after removal must be guarded, even though the growth be comparatively small, and it is exceedingly important to remove such a growth as soon as possible after its appearance.—*Roy. Lond. Ophthal. Hosp. Rep*, vol. xiv. p. 456.

Mechanism of Strabismus.—J. H. FISCHER (London) calls attention to the very important influence of the accessory adductors and abductors of the eyeball in causing and perpetuating concomitant strabismus. He suggests that the combined actions of the extra-ocular muscles in effecting even the most simple movements should be more fully recognized. As the eye is turned out the oblique muscles become abductors, with more and more power of abduction the further the eye is turned in that direction.

On the other hand, the superior and inferior recti muscles are accessory adductors, with no power of adduction if the eye is turned outward; but with

increasing adductive power as it is turned toward the nose.—*Royal Lon. Ophthal. Hosp. Rep.*, vol. xiv. p. 448.

[It is gratifying to note the more general recognition of the folly of regarding convergence as merely a function of the internal rectus and divergence a function of the external; and the equal folly of attempting to overcome all sorts of convergent and divergent squints by operations upon one or the other or both of these muscles. The surgical work of the last few years upon the extra-ocular muscles has brought this positive advance. It has to some extent revealed the incorrectness of most of the theories upon which that work was based.]

Hemianopsia and Blindness Following Uterine Hemorrhage.—A. R. AMOS (Des Moines) reports the case of a woman, aged fifty years, extremely anæmic after repeated uterine hemorrhages, who suffered from right hemianopsia, coming on suddenly with dizziness and headache. Subsequently she underwent an operation for removal of a uterine fibroid, and three days later became entirely blind. Subsequently central vision returned so that she could read Jaeger test-type at fourteen inches, but only one letter at a time, the rest of the field of vision remaining entirely blind. The restored field was not over five degrees in diameter. The ophthalmoscopic appearances remained normal throughout. The case is probably one of double homonymous hemianopsia from two lesions symmetrically placed, occurring at different times.—*American Journal of Ophthalmology*, June, 1898.

Extract of Suprarenal Capsule in Ophthalmic Practice.—J. J. KYLE (Marion, Ind.) confirms the observations of Dr. Bates regarding the astringent effect of the powdered extract of the suprarenal gland. When used in the eye, nose, or throat, no smarting or irritation is produced. In the eye there is a sense of coolness, with no mydriatic or myotic effect. The conjunctiva, regardless of congestion, turns suddenly pale, due to contraction of the coats of the vessels, and remains so from one to two hours. Nor do we notice any congestion after this astringent effect has subsided. The conjunctiva, furthermore, manifests no intolerance from long use of the drug.

In operations upon meibomian cysts, in which complete anæsthesia under cocaine is difficult to secure, on account of the great vascularity of the parts, by using the extract as indicated the operation can be done with distinctly less pain than when cocaine is used alone. The extract is especially indicated in cases of chronic trachoma characterized by marked vascularity and lachrymation, in pannus, lachrymal inflammation, acute conjunctivitis, panophthalmitis, and iritis. Again, in operating upon the lachrymal duct, complete anæsthesia is procured by injecting a few drops of the extract preliminary to the cocaine.

Care must necessarily be taken in preparing the solution and in keeping it thoroughly sterilized. It is wise, as far as possible, to prepare fresh solutions. To do this take twenty grains of the saccharated gland and a 2 per cent. solution of phenic acid; mix, and filter through filter-paper. This gives a clear solution of a brownish-red color, which must be kept corked and free from light. Two or three drops in the conjunctiva produce the complete astringent effect.—*Ophthalmic Record*, April, 1898.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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On the Hæmatozoan Infection of Birds.—W. G. McCULLOM (*Journal of Experimental Medicine*, January, 1898) has continued in Canada the observations which he began at the Johns Hopkins Hospital. He gives observations on the temperature of an infected crow, but the difference between the temperature of that and a normal bird does not seem sufficient to establish the idea of fever. The main work of McCullom's is on the flagellate forms of the organism. The granular forms of the halteridium never become flagellated, the clear forms alone becoming so. Flagellæ never develop while the organism is enclosed. He found an elongated organism in one case to move slowly across the field, followed by others. He found that these arose from the corpuscle without flagellation. Watching this from fifteen to twenty minutes, it was easy to see the change from the non-motile into the motile elongated organism. He observed in the same field a granular form and a hyaline form. The hyaline body burst from the corpuscles, threw out active flagellæ, which beat about for a few moments and finally tore away. One of the four flagellæ passed out of the field, but the remaining three proceeded toward the granular form, surrounded it, and one of them dashed into it, finally wiggling its whole body into the organism, which again became perfectly round. The remaining flagellæ, seeking to repeat this process, were evidently repulsed, and soon became inactive and degenerated. Immediately upon the entry of the flagellum the pigment of the granular body was violently agitated without any disturbance of the outline. Then a conical process appeared at one margin of the organism which developed into an elongated fusiform body which swam away with a gliding motion. He thinks that this is a sexual process; the granular is the female form, and the hyaline the male form, the flagellæ being analogous to spermatozoa.

Since writing this article he has seen the same process of apparent impregnation in case of malaria of the æstivo-autumnal type.

Studies on Trichinosis with Especial Reference to the Increase of the Eosinophilic Cells in the Blood and Muscle; the Origin of these Cells and their Diagnostic Importance.—T. R. BROWN (*Journal of Experimental Medicine*, May, 1898) gives the clinical history with the results of the examination of the blood and muscles in two cases. The most common lesion in the blood consisted in the increase of the eosinophiles. In the first case on the first examination the blood contained 37 per cent. of eosinophiles. The eosinophiles were perfectly normal, their nuclei were polymorphous, and they were

slightly larger than the polymorphonuclear neutrophiles. In the course of two months the eosinophiles fell to between 12 and 15 per cent., at which point they remained for two weeks. They then began to increase in number, and reached 68 per cent., forming more than two-thirds of all of the white corpuscles.

In the second case the number of eosinophiles was marked, making 42 per cent. of the total leucocytes. In a portion of a muscle there were numerous cells whose protoplasm showed a marked affinity for the eosin stain. The fact that some of these elements were still connected with the muscle and often showed a slight striation would seem to indicate that they were derived from the muscle substance. Throughout the muscle, between and within the fibres, there were many eosinophilic cells and ordinary polymorphonuclear leucocytes. In a specimen taken two weeks later more advanced stages of the same process were found.

He summarizes his work as follows:

In a case of acute trichinosis there was extensive leucocytosis with an absolute and relative increase in the number of eosinophilic cells associated with a decrease in the number of neutrophiles. From the examination of a specimen of muscle removed during life, beside the peculiar degeneration of the muscle, there was a longitudinal split of some of the fibres; in others, transverse splitting. There was great proliferation of nuclei and large numbers of polymorphonuclear eosinophilic cells, which were especially prevalent in some of the degenerated areas.

In a second case, beside similar changes in the muscle, there were large numbers of eosinophiles in the infected area. In two other cases there was great increase in the eosinophiles, with a coincident decrease in the polymorphonuclear neutrophiles associated with leucocytosis. The similar character of the nuclei of eosinophiles and of neutrophiles, both in the blood and in the muscles, and the presence of certain cells which might be regarded as transitional forms, suggest that the increase may take place in the muscle by direct transformation of the neutrophiles.

The article is accompanied by two plates showing the condition of the blood and the muscle.

An Experimental Study of Fat Starvation, with Especial Reference to the Production of Serous Atrophy of Fat.—C. A. HERTER (*Journal of Experimental Medicine*, May, 1898). The basis of the paper was to determine whether the lesions of rickets or similar lesions can be produced by withholding fat from the food of growing animals. The author chose pigs for his experiments. In the first experiment a pig two months old was fed with milk from which the fat had been removed, and contained less than one-two-hundredth part of the fat of sow's milk. The duration of the experiment was fifty-one weeks. During the first eight or ten weeks the animal seemed to be in every way normal except that he did not gain in weight. Constipation was marked during the experiment. After thirty weeks weakness in the hind legs was noted. After fifty weeks he was unable to stand. The muscles were flabby, but showed no indication of wasting. Examination of the blood just before death showed the hæmoglobin reduced to 65 per cent. As a result of a number of experiments it was found that a growing pig, which was fed

exclusively on this milk for but one year was retarded in growth, suffered markedly in nutrition, developed a hemorrhagic eruption, and showed marked weakness of the extremities. At the autopsy of pig No. 1, in the place of the fat there was a homogeneous translucent layer of gelatinous-looking material. This gelatinous layer consisted chiefly of spherical and oval cells, the average diameter of which was from one-half to one-sixth that of normal fat cells. Between these cells were bundles of connective-tissue fibres and elastic fibres. In another pig the skin from the back of the neck was removed from time to time; after nine weeks some shrinkage in size and some irregularity in the form of the fat cells was noted. After fourteen weeks they were shrunken from two-thirds to one-half of the normal size. Twenty weeks from the beginning of the diet the fat appeared pale, but not quite gelatinous, and the cells showed still further reduction in size. The serous surfaces of one pig showed a number of small superficial hemorrhages. The lower lobe of the right lung showed numerous infarctions. The kidneys appeared large in comparison with the body weight. There was considerable granular degeneration in the tubules, and desquamation. He considers the condition one of chronic parenchymatous degeneration. In pig No. 1 an endeavor was made to determine the nature of the subcutaneous gelatinous material. From this a proteid, probably nucleo-albumin, was derived. The lesions resulting from fat starvation, at least in the pig, did not resemble or even suggest those of rickets. Second, prolonged fat starvation leads to the entire disappearance of fat from the adipose tissues. The form of fat atrophy observed as the result of experimental fat starvation corresponds to serous atrophy described by Fleming, and is essentially the same type of fat atrophy as that found in the epicardial and perineal fat in the human subject as the result of wasting disease.

Ueber Spontane Gangrän.—HAGA (*Virch. Archiv*, clii.) describes a form of gangrene which is comparatively common in Japan. The gangrene begins spontaneously in the form of fissures or ulcers of the toes, then advances slowly until a line of demarcation is formed between the sound and diseased tissue. In some cases the gangrene heals under suitable treatment; in others it advances continuously and extends to the thigh. He gives thirty-four cases, of which only one was in a woman. The disease was most frequent between thirty-eight and forty-seven years, showing a marked difference from senile gangrene. He gives the clinical history of a number of cases. In all of the cases the radial pulse was hard and difficult to feel. The most important lesions in the examination of the tissues were found in the arteries of the part.

The illustrations which accompany the article show in some cases the typical picture of obliterating endarteritis; in others the arteries seem to become closed by an organized thrombus. In nine of the cases, along with the obliterating endarteritis, there was a cellular infiltration in the tissues, which he regarded as showing the syphilitic character of the process.

Notes on the Pathological Changes in the Organs of Birds Infected with Hæmocytoza.—W. G. MCCULLOM (*Journal of Experimental Medicine*, January, 1898) gives the results of autopsies performed on the infected birds,

the blood of which was studied by Opie. The conditions found in infection with the two sorts of organisms were practically identical. The capillaries of the liver were, as a rule, dilated, but in a few instances they were in places so crowded with infected corpuscles that the lumen was occluded. Isolated infected corpuscles were seen scattered in the capillaries of the liver, but were more numerous in the larger vessels. The organisms, in greater or less proportion, were extruded from the corpuscles and lay in the capillaries as pigmented spheres. The larger masses of pigment in the liver were contained in large cells similar to those found in malaria. The pigment was both black and straw-colored; did not give the iron reaction. The pigment was not only contained in the large macrophages, but was also found in the endothelial cells of the capillaries. Little could be said of the effect of the organisms or their products on the tissues. Necroses were observed in the organs of several specimens, but their dependence on the parasites could not be proved. The spleen is deeply pigmented, the pigment being contained in the large cells in the pulp. Degenerative changes similar to those found in the liver were found in the spleen. The visceral changes were not marked. The brain was normal. Organisms were occasionally seen in the capillaries, but they were never collected in masses sufficient to occlude the lumen. In general the changes found in the organs were very similar to those found in malaria.

HYGIENE AND PUBLIC HEALTH.

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Relation of River and Ground Water.—In providing for public water supplies wells are frequently sunk alongside of rivers for the purpose of intercepting the ground water on its way to the stream. It is perhaps most often done when the supply has hitherto been pumped from the river itself and it is desired to supplement it by a purer water for which little if any filtration is required. That such is the natural and most usual course for the ground-water to take is well known; but, being dependent on gravitation and the relative degrees of pressure exerted by the water in the river bed and in the porous soil around, it is liable to variation or disturbance.

Thus when the river flows through a highly permeable sandy soil the levels of its stream and of the ground water rise and fall together as parts of the same stream and moving in the same direction (*e. g.*, Bath, N. Y.), and when, in consequence of prolonged drought or excessive pumping, the level of the ground water has sunk below that of the river or of its bottom the movements

of the waters are reversed, that in the stream percolating outward to maintain the level of the former; but, owing to the short distance it has to travel and the depth beneath the zone of nitrifying bacteria at which it enters the soil, its filtration or purification may be very imperfect, involving the casual unforeseen pollution of a normally pure supply. In a valuable contribution to the proceedings of the German Society of Physics and Economics, Dr. H. JÄGER describes his method of determining the occurrence and the extent of intermixture by thermometric observation, followed and confirmed by chemical and bacteriological examination, the last means being under these circumstances of limited application. The municipal authorities of Stuttgart, proposing to substitute wells near the banks of the Neckar for the existing supply obtained from the river itself, sank an experimental boring about sixty yards from the river side. Dr. Jäger having noted the constant low temperature of the ground water as observed in the well, and that of the warmer river, as well as their chemical constitution and the number of bacteria in each, caused the well to be pumped until the water had sunk several feet. When it was about regaining its ordinary level the observations and examinations were repeated, and the temperature of the ground water was found to have risen considerably. Dr. Jäger, assuming this to be due to an admixture of the warmer water from the river bed, and employing a formula familiar to mathematicians, estimated the proportion of admixture at over 40 per cent., a conjecture closely confirmed by the simultaneous change in the percentage of chlorine and organic matter. The number of bacteria, however, though 28,000 to the c.c. in the river, had not risen above their normal, 10 to 12, the natural earth filtration having sufficed to arrest them.

Similar observations were made and led to like conclusions in the case of a large reservoir at Breslau, constructed in the low land adjoining the river, but receiving its supply from springs and unpolluted streams of unimpeachable purity among distant forest-covered hills.

Dr. Jäger is convinced that, while gravelly and many rocky river beds are obviously permeable, mud bottoms are not so wholly impervious as is commonly supposed; and that, even if they be so under ordinary conditions, the scour consequent on a heavy fall of rain or the strong current produced in a channel narrowed by masonry may lay bare the underlying rock or gravel, rendering percolation outward certain to follow a considerable lowering of the ground water.

Oysters and Typhoid Fever.—It is now several years since the possible connection between infected shell-fish and typhoid fever was established beyond peradventure, and nowhere has the matter been studied more carefully than in this country and in England. DR. ARTHUR NEWSHOLME (*Public Health*, September, 1898) has been much interested in the subject with special reference to Brighton, where the sanitary authorities find that, notwithstanding great care taken to prevent typhoid fever arising from infected water and milk and contaminated subsoil, they have more typhoid than might reasonably be expected. Investigation has shown that a large proportion of the cases may fairly be attributed to the ingestion of oysters and mussels infected by sewage. It appears that most of the shell-fish consumed in Brighton are derived from beds near which sewage is discharged

from a population in which typhoid fever is endemic, and that sewage-derived organisms have been found both in the mud and in the oysters themselves by Dr. Klein and Professor Boyce. Of the total number of cases of the disease occurring in Brighton during 1897, 30.7 per cent. were definitely traced to sewage-contaminated oysters and mussels; during 1896, 31.8 per cent.; during 1895, 33.9 per cent.; and during 1894, 38.2 per cent. The sanitary authorities, in consequence of the evidence of the connection, attempted, in 1896, to secure legislation to prohibit the sale, in the borough, of shell-fish known or suspected to be the cause of infectious disease, but without success, and the Local Government Board are now memorialized to confer this power on local authorities generally.

Water-borne Typhoid.—The report of the Local Government Board on the epidemic of typhoid fever at Maidstone places the blame for the outbreak where it usually belongs in such cases—that is, on the water-supply—and exonerates the defective system of sewerage, which the water company tried in vain to convict. During the ten years 1887–1896, the death-rate of Maidstone averaged well under that of England and Wales as a whole, and the typhoid death-rate was considerably less than half of that of the whole country. The town sewage is treated with lime and discharged into tide-water. Part of the town has defective, leaky old sewers, and half of the houses have water-closets with no mechanical means of flushing. The water is from three sources, but most of it is supplied by a water company which derives it from three systems of springs. Nearly four thousand of the six thousand houses supplied by this company receive water from the Farleigh Ragstone springs, examination of which showed that they are in no way protected, that the gathering-grounds of some are covered with heavily manured gardens, and that the storage reservoirs are liable to pollution by surface water and are occasionally flooded.

On September 12, 1897, there were six notifications of typhoid fever, and on the following day there were seven. Six days later the number of notifications had reached 206, and it was then noticed that the disease was almost entirely confined to the area of the Farleigh supply. Examination of the springs showed two rabbits in the catchpit of one, human feces near the cover of two others, a large deposit of decomposing feces, from a privy in a disgraceful condition, flooding the ground about fifty yards from another, many deposits of human feces in a field close by another, and fecal deposits in the immediate vicinity of several of the rest. The Sanitary Committee asked that this entire supply be cut off, and this was shortly brought about. By October 10th the notifications had reached a total of 1551, and then the weekly number began to decline sharply, so that during November there were but eighty, and during December but fifteen cases reported. During the three weeks and a half ending October 4th, the average daily number of cases was 50.8. It was during this interval that the water from the Farleigh springs was entirely shut off. During the next week the daily average number of new cases fell to 14, in the next two weeks to 5.7, and during November and December as above stated.

Repeated chemical and bacteriological examination of the water by a number of experts showed excessive organic pollution. The specific organism

of typhoid was not detected, but there was nevertheless abundant proof of fecal contamination. As the report truly says, "The specific pollution of typhoid fever, which is certainly beyond the reach of chemistry and also of bacteriology to detect, may escape detection in a water in which it is nevertheless present. Further, it is to be borne in mind that detection of a specific pollution of a supply may come too late to prevent the consumption of the contaminated water."

There were many cases of the disease that could not be attributed directly to the Farleigh water, especially those which appeared a long time after the shutting off of the supply, and these cases must be put down as of various unknown origin—direct contact, soil pollution and defective sewerage, for instance. That the committee was justified in having "no hesitation in coming to the conclusion that the epidemic was caused by pollution of the water supplied by the Maidstone Company from their Farleigh sources" is sufficiently shown by the fact that 27.5 per cent. of the houses supplied by Farleigh water were invaded by the disease, and 8.08 per cent. of the persons living in them were attacked, while the corresponding figures for the two other water sources (Crossington Springs and Boarley Springs) were 2.80 and 0.86, and 4.46 and 0.97, respectively.

Harben Lectures.—The Harben Lectures for the year 1898 were delivered by Sir R. Thorne-Thorne, K.C.B., F.R.S., F.R.C.P., Medical Officer to the Local Government Board and a member of the Late Royal Commission on Tuberculosis, who took for his subject the "Administrative Control of Tuberculosis" as applicable to the prevention of disease. The mortality from tubercular diseases collectively had, he showed by tables taken from the report of the commissioners, undergone a progressive decline at all ages during the thirty years of sanitary and social progress inaugurated by the rise of public-health legislation in the sixties, the total reduction amounting to about 30 per cent. In the case of phthisis it is even greater, having for the most productive and procreative period of life reached no less than 50 per cent. of what it was forty years ago. This improvement had begun and advanced rapidly before the infectious character of tuberculosis was suspected, when it was held to be hereditary and the inevitable destiny of persons born of phthisical parents or cursed with the taint or diathesis. The lecturer expressed hope that the pulmonary form which had proved the most amenable to sanitary and social improvement may, in the not distant future, be almost extinguished; and while noting that tabes mesenterica among infants under one year of age has, far from diminishing, increased in the same period by over 21 per cent., he encouraged the belief that even more brilliant results than are possible in phthisis may be achieved in this form of the disease.

Among the causes that have directly or indirectly contributed to the reduction of tuberculosis in general, and of phthisis in particular, are the extension of drainage in town and country, and consequent drying of the soil, the better ventilation of houses and workshops, the lesser overcrowding, and the better food, clothing, and standard of living among the mass of the people. But infants and young children in general benefit by improved sanitary surroundings even more than adults, much of whose time is passed out of doors;

and it is clear that the cause of this exception to the general improvement must be sought in the different means by which the bacillus gains entrance to the body. In pulmonary tuberculosis the bacilli from dried sputa are inhaled with the dust, and if the public could be brought to realize the danger and the duty of abstaining from expectorating save into fire or water, phthisis might almost be abolished.

The mesenteric or intestinal form of the disease is set up by the ingestion of the living bacilli; it is rare in the adult except as secondary to phthisis—a self-infection through swallowing the sputa; the facts that adults do not suffer from it to any extent, and that infants do not eat meat, are sufficient, apart from the evidence of experiments, to show that this increase cannot be ascribed to the use of the flesh of tuberculous animals; but though mammary tubercle is extremely rare in the human female, it is frequently met with in the cow, when the milk sooner or later contains bacilli which rapidly multiply in it. Such milk might be taken with impunity into a perfectly healthy stomach; but infants—constantly liable when brought up by hand to gastro-intestinal catarrhs or other disturbances—are easily infected. There is no doubt that the number of infants fed throughout at the mother's breast is becoming less every year, and this increase of intestinal and mesenteric tubercle is concurrent with the increasing consumption of cow's milk. No doubt it could be taken with impunity if boiled, and this simple precaution would probably be the means of saving some 10,000 lives annually, or 12,000 at the least, if we include tubercular meningitis, which is, as a rule, secondary to tabes. Strict inspection of all cow-sheds, the enforcement of cleanliness, adequate ventilation, etc., and the gradual killing off of all diseased animals, with their separation meanwhile from the perfectly healthy, might well be undertaken by the authorities. But the lecturer believed that notification of tuberculosis in the case of man, with the consequent loss of employment, would be attended with disastrous results to the individual and indirectly to society, would lead to concealment and neglect of treatment while the disease is still curable, and would thus defeat the intention of the law. But the public should be educated in the etiology of tuberculosis and in the means for its prevention and cure, in the proper disposal of the expectoration of phthisical persons and the necessity for the sterilizing of all milk—at any rate of that employed in the feeding of infants; while the provision in every district of sanatoria for the treatment of cases of tubercular disease still capable of cure, and of hospitals for such as are hopeless and who, owing to their circumstances not permitting of the necessary degree of isolation, are a standing danger to their families, are in the highest degree desirable.

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